

16
FIFTY YEARS

OF

**UNIFIED
TRANSPORTATION**

IN

**METROPOLITAN
BOSTON**



Price 25 Cents

**BOSTON ELEVATED RAILWAY COMPANY
BOSTON, MASSACHUSETTS**

1938

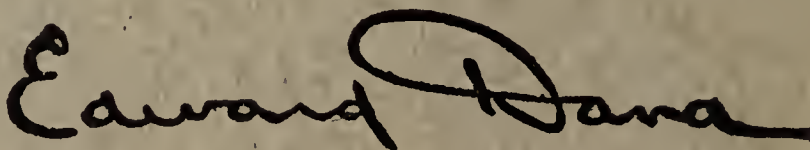
FOREWORD

DURING THE FIFTY YEARS of unified transportation in Metropolitan Boston which are covered in this historical pamphlet, public transportation was furnished, first by the West End Street Railway, and then by the Boston Elevated Railway. Neither of these names indicates the scope of the company's operations.

The West End Street Railway, one of the largest street railways in the world, took its title from a late arrival in the local field, which had been incorporated originally to furnish transportation for a new residence development in Brookline. Its incorporators were able, in a few months, to consolidate most of the local lines under the West End name.

When the Boston Elevated Railway was incorporated in 1894, the underlying purpose was to introduce rapid transit to this region. The elevated railway was the only type considered feasible at the time. Three years later the Elevated leased the West End and, with it, the Tremont street subway; and the newcomer's services became all inclusive. Today the Boston Elevated operates not only elevated lines, but subways, tunnels and other rapid transit lines, surface car lines, and trackless trolley and bus routes.

In order to picture public transportation in and around Boston prior to the unification of services, this account, from page three, tells the story of the early days of transportation. The "Fifty Years of Unified Transportation" divides itself into three periods, in each of which distinctive contributions to transportation progress were made. In the first period (1887 to 1897), the horse-car lines were consolidated, then electrified, and this story is told from page 25. The next period (1897 to 1918) was notable for the construction of elevated lines and subways. This is covered from page 47. During the third period (from 1918) the existing facilities have been improved and extended and the motor bus and the trackless trolley have been incorporated into the system. This period in the history begins on page 79.

A handwritten signature in dark ink, reading "Edward Dana". The signature is written in a cursive style with a large, looping initial "E" and a long, sweeping underline.

FIFTY YEARS

of

Unified Transportation

in

Metropolitan Boston



COPYRIGHT, 1938, *by*
BOSTON ELEVATED RAILWAY COMPANY

[illegible]

Used by General Washington in his local campaign and reproduced from Chief Justice John Marshall's *Life of George Washington*

Early Public Transportation In and Around Boston

TO APPRECIATE the evolution of public transportation in what is now Greater Boston, one must start before the time when there was any considerable need for such transportation.

With public transportation in mind, and that means local horse-drawn omnibuses, examine the map reproduced opposite. This map was used by General Washington in his siege of Boston more than 160 years ago. It is reproduced from Chief Justice John Marshall's famous *Life of George Washington*. Here the City of Boston is seen to be confined to a small peninsula. This easily accommodated a population which was not more than 10,000 when Benjamin Franklin ran away from Boston, his native city, to Philadelphia, in 1727, and which was less than one-half the present population of Revere just before the British occupation.

An idea of how small the peninsula was can be obtained by walking from Charles street through the Public Garden and out Commonwealth avenue to Massachusetts avenue. This distance would have taken one entirely across the peninsula from north to south. By lengthening the walk to include the distance from Park and Tremont streets across the Common and Public Garden and out Commonwealth avenue to Massachusetts avenue one would cover the same distance as from the Neck of the Peninsula to the extreme northeasterly tip.

Obviously there was little prospect of profit in local horse-drawn omnibus lines in a sparsely settled community where one could walk from one point to another anywhere on the peninsula in less than 30 minutes. People who had to ride and who could not afford a private conveyance could board one of the stage coaches which plied between Boston and outlying points on the roads leading into the town. These for a time also served to carry people between the town and its suburbs.

But after the country had somewhat recovered from the War of the Revolution, Boston grew rapidly in wealth and population. It was surrounded by a number of thriving settlements. The in-

creasing prospect of profit stimulated the starting of omnibus lines from Roxbury, Charlestown and East Cambridge to Boston. Even in Boston itself there were found to be a few promising routes for the omnibuses.

Active local omnibus development was well under way between 1825 and 1835, the vehicles being small, of a size to be drawn comfortably by two horses. Experiments with larger, four-horse omnibuses were not commercially successful.

By the middle of the century there was a fairly complete coverage of this area with omnibus service. This is indicated by the timetable below, reproduced from the Pathfinder, a timetable publication of the time.

The last item on this timetable relates to the Washington Street Line, subsequently known as the "Citizen's Line," running from Dock square to Canton street and giving a 5-minute service. It had been organized in 1846; and is the line referred to in a "Co-operation" article in the April, 1932, issue. This line was later of special street railway interest as it and its successors lasted well into the street railway era.*

Typical of the local omnibus lines, this line gave service with vehicles of the general type shown on page 25. The picture was made at Washington and West streets many years later, long after the Washington Street Line had been taken over and extended by a pro-

*The record shows that the then owner of the line on Dec. 16, 1889, sold 138 horses to the West End Street Railway, thus ending competition of which that railway desired to be rid.

| Omnibusses in Boston and Vicinity. |
|---|
| <i>Brighton</i> —No 2 Montgomery place, 9, 10 AM, 1, 4, 6, 7 PM. For Boston 8, 9, 11½ AM, 2, 4½, 5½ PM. 25 cts. |
| <i>Brookline</i> —No. 2 Montgomery place, 9, 10, 11 AM, 1, 2, 4½, 6, 7 PM. For Boston 8.15, 9.15, 10 AM, 12 M, 1, 3, 5 and 7 PM. Fare 18¾ cts. or 8 tickets for \$1. |
| <i>Cambridgeport & Cambridge</i> —43 & 19 Brattle st, every 15 min. 10 & 15 cts. |
| <i>Cambridge Broadway Line</i> —No 55 Court st, every hour from 8 AM to 8 PM. 10 cts, 12 tickets \$1. |
| <i>Charlestown</i> —No 43 Brattle st, every 10 min. 10 cts. |
| <i>Chelsea</i> —City Hotel, Brattle st, 9, 11 AM, 3, 5, 7 PM. For Boston 8, 10 AM, 2, 4, 6 PM. 12½ cts. |
| <i>Dorchester</i> —No 10 Franklin st, 8, 9, 10, 11, 12 AM, 1, 2, 3, 4, 5, 6, 7, 8 PM. For Boston 6½, 7, 8, 9, 10, 11, 12 AM, 1, 2, 3, 4, 5, 6, 7 PM. 12½ cts. |
| <i>Dover Street to Chelsea Ferry</i> —Every half hour; 6¼. |
| <i>Dover Street to Lowell Depot</i> —Every half hour; 6¼. |
| <i>East Boston</i> —58 Court st. 12½ cts. Every other hour. |
| <i>East Cambridge</i> —Office at City Hotel, Brattle st; every half hour. 10 cts, 16 tickets \$1. |
| <i>Fitchburg Railroad</i> —State street. To connect with every train out, and in. |
| <i>Grove Hall</i> —No 10 Franklin st, 8, 9, 11 AM, 1, 2½, 5, 6, 7 PM. For Boston, 7, 8, 9, 11 AM, 1, 2, 3, 4, 5, 6 PM. 12½ cts. |
| <i>Jamaica Plains</i> —No 2 Montgomery place, 7½, 9, 10, 11, 12 AM, 1, 2½, 3½, 4½, 5½, 6½, 7½, 9½ PM. For Boston 6¾, 7, 8½, 9½, 10½, 11½ AM, 1, 2, 3, 4, 5, 6½, 8 PM. |
| <i>Malden</i> —Brattle sqr, 12 M, 5 PM. For Boston 8 AM, 2 PM. 12½ cts. |
| <i>Medford</i> —Brattle sqr, 10½ AM and 4 PM. Sundays 9¼ AM, 7½ PM. For Boston 10½ AM, 4 PM. Sundays 8 AM. & 5½ PM. Fare 18¾ cts. Sundays 25. |
| <i>Roxbury</i> —(H. King's) cor Cornhill & Washington st, every 15 min. 10 cts. 16 tickets \$1. |
| <i>Roxbury, Mt Pleasant</i> —Cor Cornhill & Washington st, every half hour. 10 cts, 16 tickets \$1. |
| <i>Roxbury</i> —(Tremont road) cor Court & Tremont sts, every hour. 10 cts. 16 tickets \$1. |
| <i>South Boston, Mt Washington</i> —Cornhill, every 15 min. 6¼ cts. |
| <i>State Street to Lowell Depot</i> —Every half hour; 6¼. |
| <i>Washington Street Line</i> —Dock sqr to Canton st, every 5 min. 6¼ cts. 20 tickets \$1. |

LOCAL TIMETABLE AND
FARE SCHEDULE IN 1849

gressive pioneer transportation man of the time and region, Jacob H. Hathorne.

A WELL-KNOWN OMNIBUS LINE

MR. HATHORNE furnished service between Boston Neck and Charlestown Neck, the regions where respectively the Boston and Charlestown peninsulas joined the mainland. Quoting from the earlier issue of "Co-operation":

"The Hathorne line ran in a generally northeasterly and southwesterly direction. It was the successor of a shorter line which was taken over by Hathorne in 1851. The extended route was *via* Washington street, Boston, the northern railroad depots, Warren Bridge and Main street, Charlestown. A Boston Elevated engineer remembers the term 'Shawl Line' jokingly applied to the Hathorne Line as it 'ran over the Neck and back.'

"Passengers entered the Hathorne omnibuses by means of a ladder and a rear door. They could climb to the roof. The door was operated by the driver's foot and inside passengers handed their fares up to him.

"On the coach pictured is a sign indicating the fare as 4 cents."



Courtesy of F. L. Dunne

THE STAGE COACH OR OMNIBUS FLOURISHED LOCALLY
UNTIL DISPLACED BY THE ELECTRIC CAR

HORSE RAILWAY ENTERS THE FIELD

IN Boston the horse-drawn omnibus had no competition for 25 years; that is, in the second quarter of the 19th century. During this period horse railways had been successfully used for heavy hauling and they looked promising for passenger transportation also.

There was much to be said in favor of the omnibus. It could go anywhere, and the investment per vehicle was small. In heavy winter weather, runners could be quickly mounted on the axles in place of the wheels, resulting in a smooth-running sleigh. This was an important consideration in the Boston winter climate.

At the same time, nobody could dispute the obvious advantages of the railway. While the track did involve a substantial investment, it enabled a horse to pull a much greater load at a higher speed. The street surfacing of a hundred years ago, or even less, was far from smooth so that riding on rail cars was more comfortable than in omnibuses. There was of course the disadvantage of interference with service by snow and ice, requiring the track to be cleared. A century has not changed this situation, although highly efficient snow-fighting equipment has been developed to cope with it.



Ballou's Pictorial

RUNNERS UNDER THE OMNIBUSES WERE USEFUL IN WINTER (1856)

A serious obstacle which the proponents of street railways had to overcome was the natural objection of the public to the laying of rails in the streets. The track construction of the time was crude, judged by present-day standards. At first rolled or cast iron straps were spiked to light wooden sills or stringers, fastened on wooden cross ties which might be 7 to 10 feet apart. These were early replaced by tram rails with a raised portion either at the side or in the center to guide the car wheels better. Such stringer construction was economical and fairly satisfactory for use with the light-weight cars of the day.

In spite of reluctance to permit rails to be laid in the streets, public opinion was eventually favorable to a trial of the street railway, and thus began a long period of competition, in and around Boston, between the two types of transportation. The odds increasingly favored the railway, as construction and operation improved consistently.

A West End Street Railway historian looking back nearly forty years from 1892* mentions as the forerunner of the local horse railways a line about 1½ miles long which connected Harvard College in Cambridge with the Fitchburg Railroad at Union square, Somerville. Its equipment, he stated, consisted of a steam passenger coach which had seen better days. This was drawn by a pair of horses. It was operated to connect with the Fitchburg passenger trains when there were any passengers to be accommodated. This was a private line built on private property.

LOCAL DEVELOPMENT OF THE HORSE RAILWAYS ‡

“IN the early part of 1853 the Massachusetts Legislature granted a charter to a company, empowering it to lay rails in the streets of Boston and Roxbury, for the purpose of carrying passengers between these two cities in cars drawn by horses, and a charter was also given a little later in the same year to a company organized to build a line from Boston to Cambridge. These were the first street railway companies organized in Massachusetts.†

“There were the usual delays incident to the organization of a new enterprise, and it was not until December, 1854, that the

* Louis P. Hagar, History of the West End Street Railway.

‡ This section is based partly upon a report on “The Development of Street Railways in the Commonwealth of Massachusetts,” prepared by W. S. Allen of New Bedford, and published in 1900 by the Commonwealth. Quotation marks indicate the excerpts from Mr. Allen’s report, on this page and the top of page 29 and on pages 31, 32, 33.

† The first street railway line in this country was started in New York, Nov. 26, 1832. It ran on 4th Avenue, between Prince and 14th Streets,



Courtesy of State Street Trust Company

HOW THE BACK BAY APPEARED FROM CAPITOL HILL BEFORE THE RECLAMATION

Cambridge road obtained a location in the streets. After securing this right, an attempt was made to induce the public to subscribe for the stocks and bonds of the new company, but there was very little response, only a few thousand dollars being raised in this way. A contractor was found willing to build the road and to receive his pay in the securities of the company, and on March 26, 1856, the road was opened to travel." Operation started at the Cambridge end of the line and it was soon extended to Bowdoin square, Boston, a distance of about three miles.

CAMBRIDGE HORSE RAILROAD STRUCK PUBLIC FANCY

IT is difficult nowadays, in view of the comprehensive transportation system which Boston and its environs enjoy, to visualize the sensation made by the first regularly incorporated horse-car line in this region, the Cambridge Railroad Company. In its issue of March 25, 1906, the eve of the 50th anniversary of this significant event, the *Boston Globe* published an historical article of great human interest. Some notes from this article follow:

"Years and years ago when people used to luxuriate in omnibuses and imagine they were spending money with monstrous improvidence, the Cambridge Railroad Company laid car tracks from Harvard square to Bowdoin square, and then disposed of its franchise to the Union Railroad Company, and nine men entered the employ of the new traffic company—John C. Stiles, Charles H. Hunnewell, Patrick Manning, John Byrnes, Simon Knight, Bailey Shackford, L. M. Greenwood, Charles Dowd and A. Wilson Green. Of this number, one is dead, two are retired, and the others are faithful employees in the service of the Boston Elevated Company. To them March 26 is a date of dates, because it marks the 50th anniversary of the informal opening of the Cambridge Railroad Company and of the beginning of their service.

"Mr. Stiles was the superintendent of the Union Railroad Company. Mr. Hunnewell was the first conductor. Messrs. Byrnes, Knight, Dowd, Greenwood and Shackford were drivers, and A. Wilson Green and Patrick Manning were employed in the stables. Green and Manning are still (i. e., in 1906) employed in the stables."

The *Globe* states that the other street railroad corporation in Boston, the Metropolitan, the so-called Roxbury Line, was striving with might and main to get its equipment running. In order to beat its rival, the Cambridge company sent repre-

sentatives to New York to buy several second-hand cars. Meanwhile the Metropolitan company rushed letters to the builders urging them to send cars with all haste. The ingenuity of the Cambridge line won the victory. Service was inaugurated with one of the second-hand cars, on which was the legend, "Car to Greenwood Cemetery," the destination of the line in New York upon which the car had been operating.

Some excerpts were made by the *Globe* for the above article from the local papers. These give so graphic a picture of the new service that they are reproduced below:

Herald.—Yesterday the cars of the Cambridge Horse Railroad commenced running as far as the toll house, Boston side. While the cars were passing down Main street yesterday afternoon, a son of Postmaster James was run over by a team furiously driven, breaking one arm and otherwise injuring him. He, with other boys, were running after the car, and did not see the approaching team.

Traveler.—The experiment upon the railroad (i.e., the Cambridge Horse Railroad) yesterday is highly satisfactory to the managers of the road. It is thought that one horse will draw with ease a car capable of holding 50 persons.

Post.—The Cambridge Horse Railroad Company made their first trip in a car drawn by horses from Cambridgeport to Boston yesterday morning at 9 o'clock. The road is in excellent order, and a very agreeable trip was made in 10 minutes. The cars will soon run up to Bowdoin square in this city.

Transcript.—Five trips were made over this road (i.e., the Cambridge Horse Railroad) yesterday, to the perfect satisfaction of a throng of passengers. It was demonstrated that two horses, tandem, made the trip with a car containing 40 passengers, with more ease than they could have drawn an empty omnibus in the street. A special trial trip, for the observation of a number of gentlemen, was made early this afternoon. The cars will commence running regularly next week, and the tracks will be completed the whole distance between the Revere House and the Brattle House during the month of April. This is the first horse railroad for passengers in New England.

Transcript.—We learn from Mr. J. C. Stiles, the gentlemanly and courteous superintendent of the road, that upward of 2000 passengers were conveyed over the line on Saturday afternoon last and we cannot but congratulate our Cambridge friends who do business in this city for this new facility of travel between the two places, being so much more convenient than the ordinary omnibus conveyance. On entering the car the traveller is not subjected to the task of assuming the position of a half-moon, dreading the idea of having his best beaver or her best silk bonnet ruined by a lurch, as in the case of getting into an omnibus. The great reduction there is to be in the fares of this road when it is completed will commend it to favor. Thus far it has exceeded the most sanguine expectations of the proprietors as well as our suburban friends.

Advertiser.—An experimental trip upon the first horse railroad (i.e., the Cambridge Horse Railroad) constructed from the suburbs into the city of Boston was made yesterday. A comfortable car, capable of containing 20 persons, was running yesterday from Cambridgeport to North Grove Street. It was drawn by two horses, and the trip was made from the office of the *Cambridge Chronicle* to the foot of Cambridge street in a space of 11 minutes. All the passengers were delighted with the ease and expedition of the trip. The cars will be run to Bowdoin square as soon as the street is clear of ice.

Journal.—We understand that the cars are today running upon the Cambridge Horse Railroad between Cambridgeport and the city. They come into the city as far as North Grove street, which is as far as the ice will permit. The track to Bowdoin square will be cleared in a day or two, and the cars will then come to that terminus. They are running today as an experiment, and a free ride is offered to all. It is hardly necessary to say that they are crowded and that everybody appears delighted with them. They will not commence running regular trips for some days. The introduction of horse railroads is an important event in our city. We hope ere long to learn that the other routes in contemplation are approaching completion.

The Cambridge Railroad Company, states the *Globe*, did business free of charge for two months, while the experimental features were being studied. There was great resentment when, the experimental period being over, a fare of 10 cents was charged.

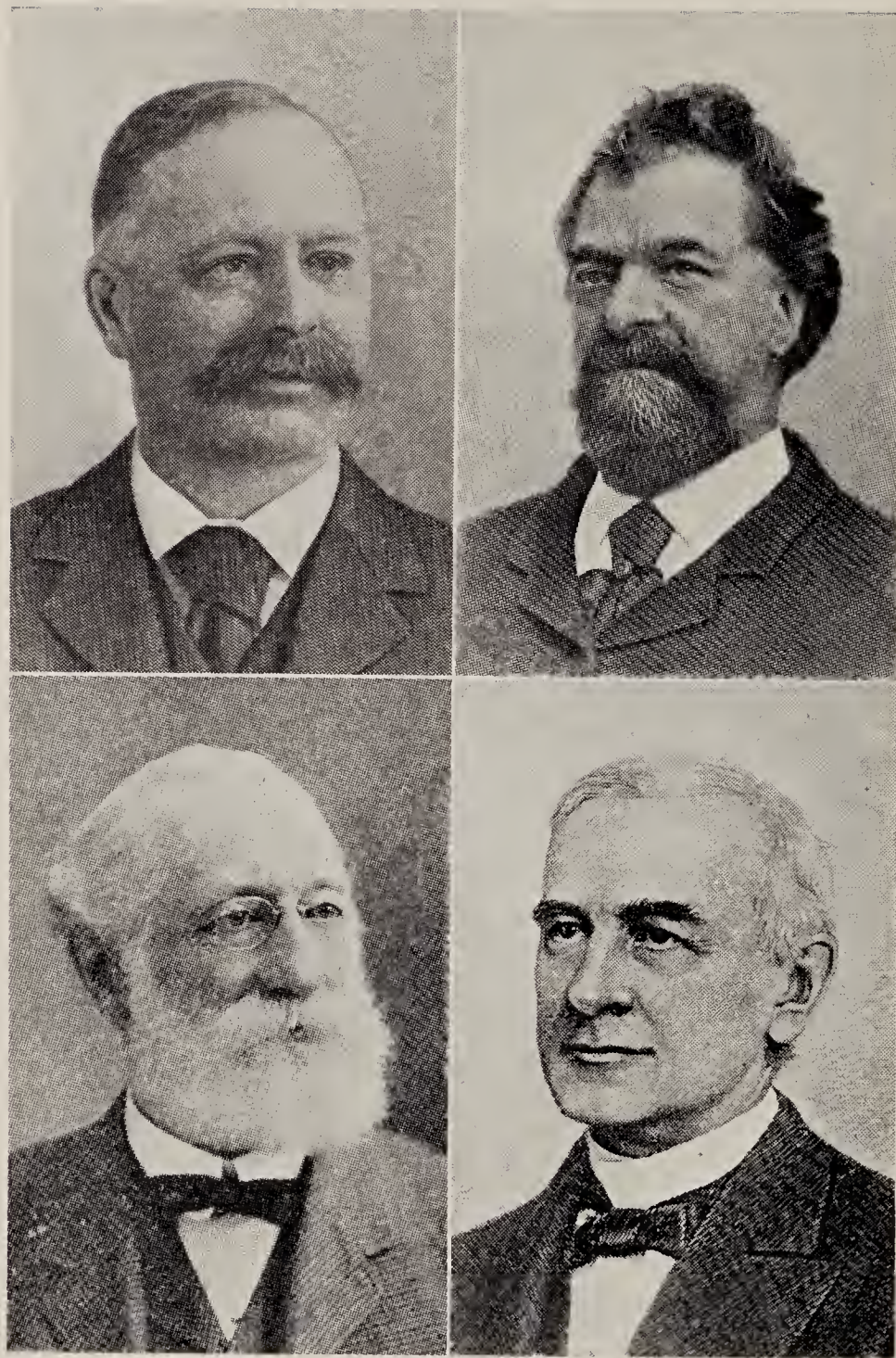
OTHER HORSE RAILWAYS SOON FOLLOWED

“THE opening of the Cambridge Railroad was soon followed by the organization of several other companies which proposed to connect outlying portions of Boston with the center of the city, or to furnish means of communication between Boston and neighboring cities and towns. In September, 1856, the line connecting Roxbury with Boston was opened, the next year Charlestown secured this form of transportation, and in 1858 the peninsula of South Boston was connected with the city proper by a line of horse cars. Previous to this time these places were served by lines of omnibuses. The population of the different districts which secured the new means of communication was by the census of 1855:

| | |
|----------------------------|---------|
| Boston (city proper) | 126,296 |
| Cambridge | 20,473 |
| Charlestown | 21,700 |
| Roxbury | 18,469 |
| South Boston | 16,912 |

“These railways in the streets served to unite suburban communities with the heart of the group of municipalities, and although there were long stretches of vacant land and marshes separating these suburbs from the city proper, it was evident that in time these intermediate districts would be filled with houses, and that the marshes would be converted into solid ground and covered with residences.

“In 1859 a railway of a different character was built. This road—the Lynn and Boston—was built from Charlestown to Lynn, a distance of about ten miles, and for the first time in Massachusetts an interurban road was opened for operation. A long stretch of country not built up, and showing no immediate pros-



FOUR PIONEERS IN UNIFIED TRANSPORTATION IN METROPOLITAN BOSTON

Upper left, Henry M. Whitney, organizer of the local street railway consolidation and first president of the West End Street Railway. *Upper, right*, Calvin A. Richards, president of the Metropolitan Railroad and a proponent of the consolidation. He served for the first few weeks as general manager of the West End. *Lower, left*, Julius E. Rugg, superintendent of transportation of the Highland Street Railway, and later of the West End Street Railway and of the Boston Elevated Railway. *Lower, right*, Samuel Little, an organizer of the Highland Street Railway, and successor to Mr. Whitney as president of the West End Street Railway.

pect of possessing a dense population, was traversed by this road, but there were some settlements along the line of the old turnpike road, upon whose surface the rails were laid, and Lynn—then a city of about nineteen thousand inhabitants—was brought into close connection with these towns and joined to Boston by a street car line.

“The roads built prior to 1860 were laid with light rails, in several cases of cast iron, and over these rails cars drawn by horses were run at an average rate of speed of but little over six miles an hour. Imperfect as this form of transportation would be regarded today, it grew steadily in favor with the public, and the roads soon paid good dividends to their stockholders. The success of this new method of passenger conveyance through the streets became so marked that other promoters quickly sought an entrance into the new and profitable field of city transportation. The Legislature and the City Council of Boston, full of the fallacious belief universally held at that time, that the more competition there was in street transportation the better off the community would be, freely granted rights to these new companies to occupy the city streets.

“This competition led to the absorption and lease of weak lines, and the number of companies was reduced, until in 1865 there were only four street railway companies operating in Boston, each serving a different district. To the north, connecting Charlestown with Boston, and there meeting the Lynn and Boston Railroad,* extended the Middlesex Railroad; to the west the Union Railroad Company, the lessee of the Cambridge Railroad Company, united Cambridge and Boston; to the south the Metropolitan Railroad served to connect Boston with Roxbury, and towards the east the South Boston Railroad brought the detached settlement on the peninsula projecting into Dorchester Bay into closer connection with the heart of the city.

“These four roads continued their separate existence for about twenty years, during which time other competing roads were built, The Highland Street Railway, originally built as a competitor of the Metropolitan Railroad in the Roxbury district, proved itself capable of independent existence, as the large amount of land made by filling in the Back Bay drew a large population into a district lying to the west of the original Metropolitan lines, and poorly served by them.”

* The Lynn & Boston had a “location” over the tracks of the Metropolitan “for the purpose of transporting its own passengers to and from ‘Scollay’s building,’ so-called, in Court street, and the Chelsea Ferry landing at the foot of Hanover street.”

SOME SIDELIGHTS ON THE OMNIBUS AND EARLY HORSE CAR DAYS

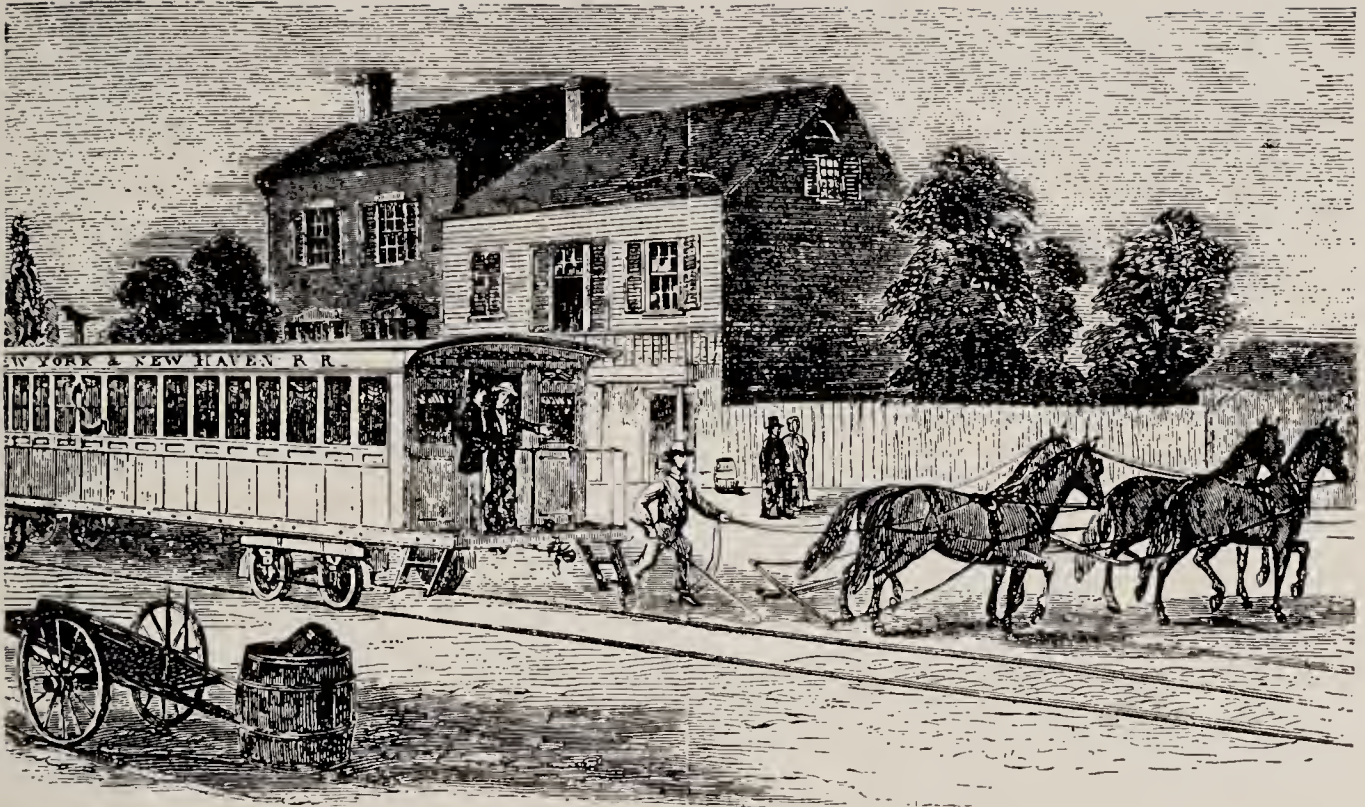
FOR sake of continuity the preceding section was not interrupted for the relating of interesting incidents and opinions which are preserved in the records. Only a few typical items can be included here.

In the issue of the *Harvard Graduates' Magazine* for December, 1911, F. W. Coburn, Harvard Class of 1891, contributed an interesting reminiscence entitled "From Stagecoach to Subway." He quoted the poet Henry W. Longfellow's characterization of a journey, in the eighteen-thirties, homeward from a dinner in town, as follows: "The omnibus rattling and reeling to and fro; and an old lady in black, with silver spectacles, is getting out, the horses start; she staggers back, then pitches forward and exclaims: 'Oh! I feel as if I had taken my bitters!'"

Referring to the then rapid-transit extensions, Mr. Coburn said that "they would be used by men who had already received their degrees from Harvard before the first little green horse cars began jogging past each other in front of the Revere House, Bowdoin square."

Mr. Coburn also quoted Professor John Fiske, the noted historian and philosopher, who, in speaking of his first days in Cambridge in 1860, said: "Horse-cars came and went on weekdays, but on Sunday he who would visit Boston must either walk or take an omnibus, in which riding was penance enough to atone for the sin."

Referring to the success of the Cambridge horse railroad which, Mr. Coburn stated, in the first three months of operation carried an average of 67,200 passengers a month. He credits this success with the prompt development of other horse-car lines in Greater Boston. He quoted from an editorial in the *Cambridge Chronicle* of August 2, 1856, the following: "Delighted as we are with the Cambridge railroad, we are pleased to see that the spirit of improvement in the metropolis is turned in this direction. The conveniences and comfort of the street railroad must be experienced to be appreciated; and we have so long experienced these here that the ceaseless satisfaction of those blessings has grown a necessary part of our daily pleasures—as the song birds upon the trees, or the murmur of pleasant waters that have grown familiar to the ear. Tinkle ting; tinkle ting;—why we are having sleighing the year round; even while the thermometer stands at 98!"



Illustrated London News

THE NEW HAVEN FOUND HORSES USEFUL

Some instructive comment on the Highland Street Railway was given in an article on "Early Street Railroading" in the *Electric Railroad*, in the May, 1901, issue. The article states that the Highland "was the best equipped of the several (local) street car lines, its cars being handsome specimens of this class of architecture, and their bodies were ornamented with the conventional plaid of the Scotch Highlanders, in the center of which on either side was a panel representing some historical scene or a portrait of some one of Massachusetts' governors for whom the car was named. It was the first to uniform its employees, adopting for this purpose a gray cloth similar to that of the letter carriers' uniforms. It was a well managed corporation, exacting the strictest courtesy from its employees towards the patrons of the road, in return for which it paid liberal salaries and otherwise encouraged those who held subordinate positions. The lines were never pecuniarily profitable until long after the company had passed out of existence."

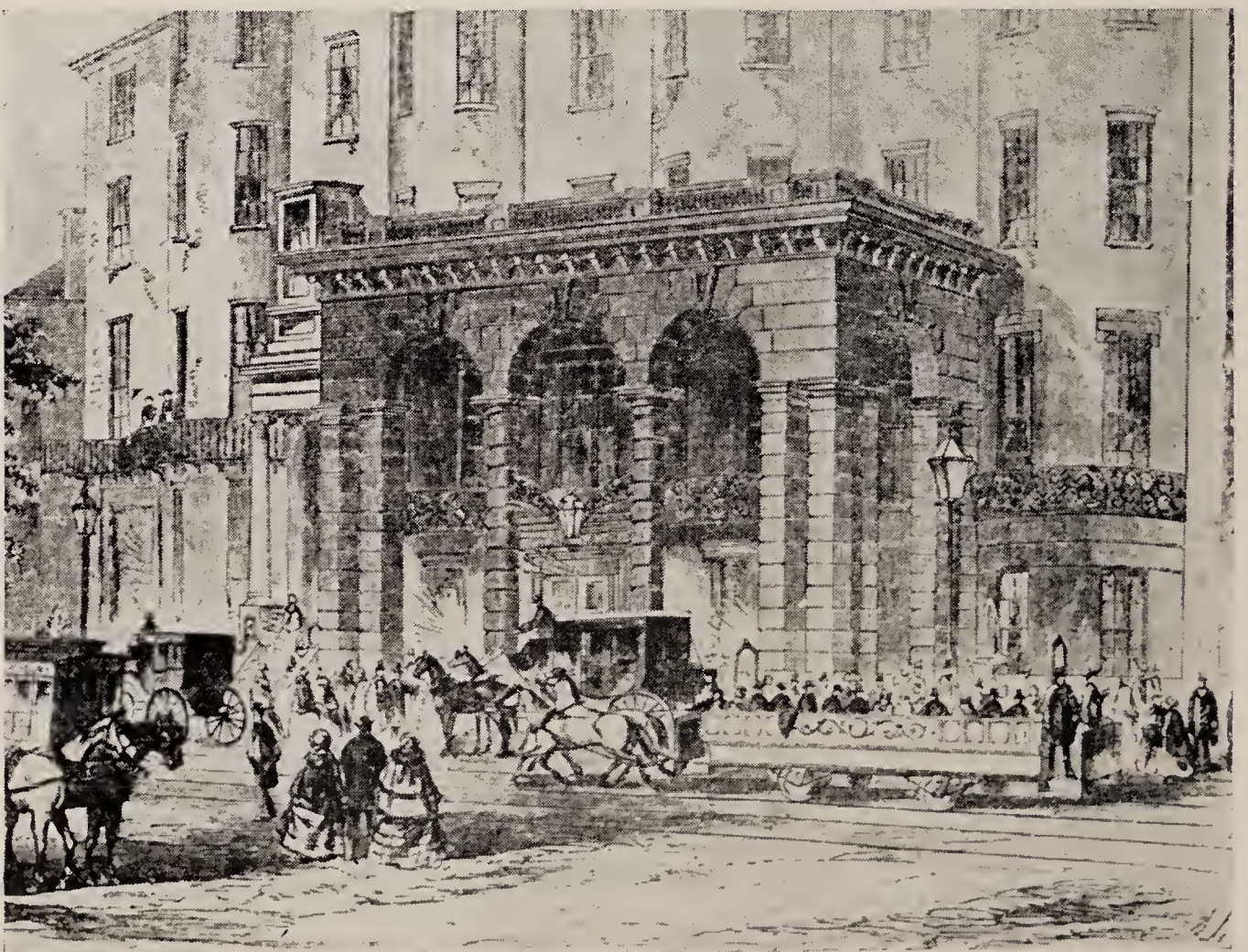
WM. A. BANCROFT JOINS CAMBRIDGE RAILROAD

IN 1885, a young lawyer, William A. Bancroft, a Harvard graduate, active in Cambridge affairs and in the State Militia, was selected by the directors of the Cambridge Railroad to be superintendent. At that time he was just finishing three years of service as a member of the General Court. He continued as superintendent when the Cambridge and Charles River roads combined.

Then when the West End was formed he was appointed general road-master of the entire system. In 1889 he returned to the practice of law. Colonel Bancroft, as he was then known, later found good use for his practical railway and public service experience, for when the Boston Elevated Railway Company was formed he was elected vice-president and member of the executive committee of the directors. On Oct. 13, 1899, he was elected president.

HENRY M. WHITNEY ENTERS STREET RAILWAY FIELD

IN the middle eighties, a prominent business man of Boston, president of the Metropolitan Steamship Company, a line running between Boston and New York, became interested in local real estate development. He foresaw the possibilities of then undeveloped land in Brookline directly adjacent to Boston, and bought up all the promising land along the line of a proposed boulevard (the present Beacon street in Brookline) with a view to developing a high-grade residential section. He offered to contribute about one-half of the land necessary for the widening, and in addition the sum of \$150,000 toward the construction costs if the town of Brookline would do the rest. The boulevard was to have



Ballou's Pictorial

IN FRONT OF THE WINTHROP HOUSE IN EARLY HORSE-CAR DAYS (1857)

two wide roadways, with a central reservation for a proposed street railway line and a bridle path. This was agreed to, and the ambitious boulevard project was put through. To build and operate the street railway a new company, the West End Street Railway, was formed.* This company also secured other locations in Brookline, and it and the Suburban Street Railway were granted locations in Boston to provide connections with other lines.

At this time Mr. Whitney had passed his fortieth year, and had behind him a successful business career. Conway, Massachusetts, was his birthplace, and except for one year in the Williston Seminary at Easthampton, his education had been obtained in the Conway public schools. After working awhile in Conway he came to Boston, where his father had been made Collector of the Port. He was employed in the Custom House for a short time and then went to New York, where he worked for a shipping concern. In the meantime his father had become interested in the Metropolitan Steamship Company and he secured employment with it. He gradually worked himself up into the management and in 1870 he became president.

Mr. Whitney's organizing ability was given a severe test when he tried to bring the West End Street Railway into co-ordination with the large street railways of Boston. The eventual outcome was a consolidation of practically all of the lines, with himself as president. The consolidation took the name of the recently organized West End.†

For general manager‡ of the consolidated street railways Mr. Whitney selected D. F. Longstreet, then vice-president of the Union Railroad Company, in Providence. Mr. Longstreet, an energetic and progressive man of 42, had been connected with the Providence property for 23 years, having worked his way up from driver. He was an outstanding horse-railway operator. He was financially interested in the Union Railroad and, next

* Really two companies were formed, the West End Street Railway Company and the Suburban Street Railway Company. A certificate of organization of the West End was filed Jan. 22, 1887, and the Suburban followed on Apr. 1, 1887. Early in 1888 the Suburban consolidated with the West End.

† The railways consolidated with the West End Street Railway were:

Boston Consolidated Street Railway.
Cambridge Railroad.
Metropolitan Railroad.
South Boston Railroad.

West End consolidation dates:

Act passed permitting consolidation, June 15, 1887.
Actual consolidations, November, 1887.

‡ Strictly speaking, the first general manager was Calvin A. Richards, who had been president of the Metropolitan Railroad and who served the West End as general manager for a few weeks to help launch the consolidation.



From Collection of Edw. S. Webster, Esq.

CHURCH GREEN IN THE MIDDLE HORSE-CAR DAYS

to the president, the ranking official. But Mr. Whitney was persuasive, offering a liberal salary and a commanding position in a great street railway, and Mr. Longstreet was won over.*

The first auditor of the West End was Charles S. Sergeant, who before 1888 had not been a street railway man but had had many years of experience in accounting work, mostly with steam railroads. He was 36 years of age when he joined the West End organization.

After a short time Mr. Sergeant became general manager of the West End, which he continued to be until the property was leased by the Boston Elevated Railway in December, 1897, when he became general manager of the Elevated and later vice-president. He remained with the Elevated until after the public trustees took control in July, 1918.

A few months after the West End was formed Mr. Whitney employed as head of one of the departments in the auditor's office a young man, Henry L. Wilson, who had then recently gained experience in street railway accounting in Kansas City. He suc-

* Mr. Longstreet remained only a year or so in Boston, but he had the fortunate experience of being general manager during the installation of the electrical equipment. This experience he soon decided to capitalize and he left Boston to undertake a contract for the construction of an electric railway of some magnitude in Denver, Colo., risking his savings in this venture. Mr. Longstreet died in Brighton, Mass., January, 19, 1937, aged 90 years.

ceeded Mr. Sergeant as auditor, retaining that title with the Boston Elevated Railway, of which he was afterward successively comptroller and treasurer.*

WEST END WAS ONE OF THE PIONEERS IN STREET RAILWAY ELECTRIFICATION

SOON after the horse railways of the Boston region had been consolidated through the enterprise and organizing skill of Mr. Whitney, he began to look about for a better form of motive power. Horses had served fairly well for the time when the railways were in small units and the routes were not too long. Speed was, fifty years ago, not the prime consideration that it is today.

But caring for the more than 8,000 horses of the combined railways was a tremendous problem, and Mr. Whitney's thoughts turned naturally to the mechanical cable, driven from a central power house and carried on sheaves in a conduit located between the track rails. At the top of the conduit was a narrow slot, not over an inch wide, through which the driving force was carried up to the car by means of a clutch or "grip." The "grip-man," by means of a lever, was able to cause the car to be propelled by the cable at a fixed speed unless he allowed the grip to slip somewhat. As slipping the grip was permissible only to prevent too violent a start, the cable cars most of the time ran with the cable. Steps were taken by Mr. Whitney preliminary to installing a cable system, but as the cable was finally not adopted for Boston, it is mentioned here only because it was successful in many cities and was superior to other forms of motive power available before the time of the consolidation in Boston.

While Mr. Whitney was a newcomer in the street-railway field, the West End manager, D. F. Longstreet, then recently imported from Providence, R. I., was an experienced man in this field. In spite of the enormous investment required for a cable system Mr. Longstreet at first favored that system because a large amount of power was available at the points of attachment of the "grip" to the cable.

Mr. Whitney, also, advocated that the cable system be adopted, but he was impressed by what he had heard about the progress

* Mr. Wilson retired from the treasurership on Jan. 1, 1937. On Aug. 14th, 1931, he had the honor as treasurer of signing a 40-year 6 per cent gold bond for the vast sum of \$21,000,000, given by the Railway to the Metropolitan Transit District in connection with the retirement of the Company's preferred stocks. On Aug. 19, 1931, Mr. Wilson signed a check for \$1,409,253.35, which covered payments to the cities and towns of the District of the amounts remaining unpaid from the 1919 Loan Assessment.



Ballou's Pictorial

THE HORSE CARS SERVED THIS MARKET CENTER AT BOYLSTON
AND WASHINGTON STREETS (1856)

being made at different points with the electric car. In most cities the experiments with electricity were on a small scale, but an exception was Richmond, Va., where a young Naval Academy graduate, Frank J. Sprague, was completing a heart-breaking contract for an extensive electric railway system. The term "heart-breaking" is deliberately chosen because Mr. Sprague's company had had little experience in this field, was not conversant with the topography of this rather hilly city and did not realize that the promoters were installing a type of track construction which might almost be termed flimsy. To make matters worse, Mr. Sprague was stricken with typhoid fever while the Richmond job was under way with a strenuous time schedule to meet.

As a practical man, Mr. Whitney wished to know about the electric railway experiments at first-hand, especially he wished to see what was going on in Richmond. Accompanied by Mr. Longstreet he visited that and other cities, and came back to Boston firmly convinced that electricity offered the greatest possibilities for Boston. This was a courageous decision to make in view of the experimental character of the existing electrifications, even including Richmond.

FIRST ELECTRIC CARS IN BOSTON

THE logical outcome of Mr. Whitney's Richmond visits, for he made three visits, was the award of a substantial order to the Sprague Electric Railway and Motor Company. It covered the electrification of a line running from Park square, by way of Boylston street, West Chester Park (now Massachusetts avenue), Beacon street, Coolidge Corner and Harvard street to the Allston railroad station in Brighton. A branch of the line also ran from Coolidge Corner to Chestnut Hill avenue, that is, to the Chestnut Hill reservoir. There was to be a power house on Braintree street in Brighton. This was built in due course and is now incorporated as a part of the Allston Garage. It contained two 200-horsepower high-speed automatic cut-off engines, each driving two 80-kilowatt Edison "dynamos."*

It is possible, fortunately, to continue the Boston story in Mr. Sprague's own words:†

"We went to work vigorously," he said, "on the contract which

* The word "dynamo" is placed in quotation marks as an obsolete term for "electric generator," the term now used, although "dynamo" was popular in 1887.

† From an informal address to the New England Street Railway Club (now the New England Transit Club), on December 15, 1932.



Ballou's Pictorial

A FOCAL POINT OF HORSE-CAR TRAFFIC SEVENTY-FIVE YEARS AGO

Mr. Whitney gave us, which was to furnish thirty cars. But Mr. Whitney ran into a snag with the city fathers. He found that they did not wish to permit overhead wires. There was a great hurrah about the danger of overhead equipment, so the company put in a section of Bentley-Knight underground conduit* from Park square to Charlesgate. The balance of the line was an overhead line. We put up a good line, and it worked well. Finally it was decided by Mr. Whitney that he would like to abandon the conduit system both because of the cost and the difficulties which it was developing. He believed that if the city fathers were familiar with the possibilities of rapid transit from an overhead system, they would be willing to grant the required permission.

"Now, in Richmond, we had started with single-gearred motors. They were much over-taxed, so we changed to double-gearred motors, and that was the type which we used in Boston. But we had kept a part of the old equipment with single gear. I arranged a demonstration with the single gears for Mr. Whitney. We equipped a car with them and invited a group of the City Councillors to ride in this car. I ran the car regardless of the possibility of jumping the tracks, at the highest speed I could make. Fortunately, the little car hung to the rails, and we reached about 25 miles an hour, which seemed a high speed. After that ride the Councilmen were all won over. They gave Mr. Whitney permission to erect overhead wires throughout the city."

While Mr. Sprague's pioneer work in Boston laid the foundation for the later complete electrification of the West End, his company did not get the subsequent work, which went to the local Thomson-Houston Company† at Lynn.‡ The "T-H" company had, early in 1889, equipped a demonstration line of 20 cars

* The principles of the Bentley-Knight System are explained on page 23.

† Dr. Elihu Thomson, founder of the Thomson-Houston Electric Company, died at his home in Swampscott on March 13, 1937, in his 84th year.

‡ In his first report to the stockholders of the West End, dated November 8, 1888, President Whitney explained the motive power situation in these words: "Desiring to improve the facilities for transit, the management early in the winter investigated the subject of cable roads. This system is found to work very satisfactorily in many large cities, and it was thought that it could be introduced in Boston and suburbs to advantage; but developments of the electric system were called to the attention of the management early in the summer, and the guarantees of successful operation of these roads which were given by several electric companies, together with subsequent investigation by a majority of the Board of Directors of the systems in successful operation in Richmond and in Allegheny City, and by the Board of Aldermen of the City of Boston, have induced the Directors to give the electric system a trial. Locations in Boston and in Brookline have been obtained, and the electric system is now being put in, and will be in operation probably before the first of December." (Editor's Note: The second annual report states that the Brookline line was opened with conduit the 1st of January, 1889, and the Cambridge overhead line, the 16th of February. Since the 1st of November, states this report, the Company has been operating all the electric cars that it is now running, namely, the Brookline, Brighton, Cambridge and Arlington lines, from its Power House located at Allston. The conduit operation on the Brookline line was, of course, only on the Boston end of the line).



Street Railway Journal

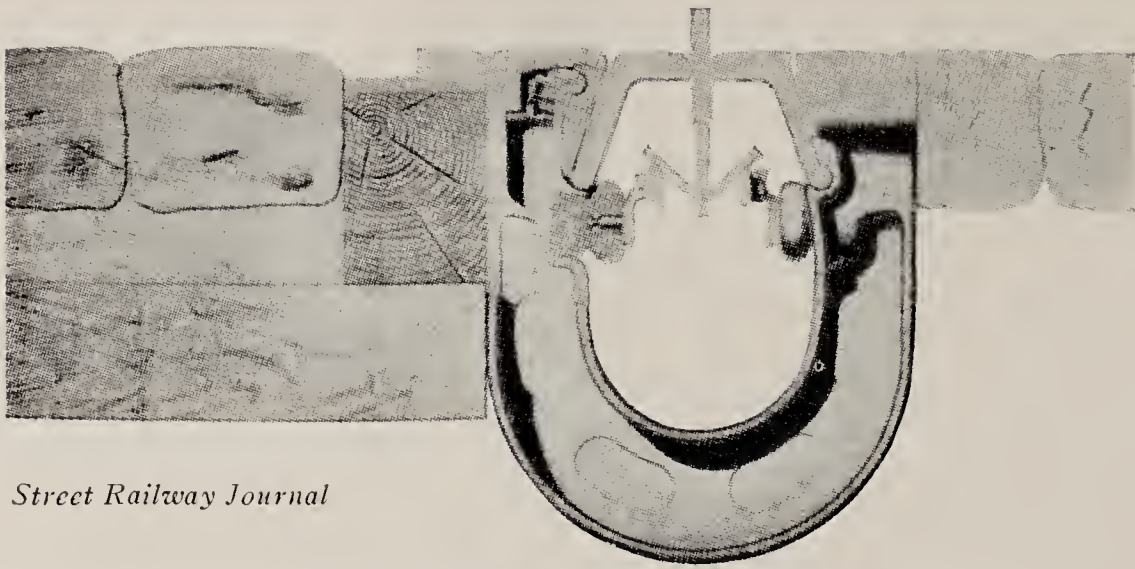
ON BEACON STREET, BROOKLINE, IN 1889

from Bowdoin square, Boston, to Harvard square, Cambridge. These were the points which had been connected by the first horse railway 33 years earlier. This resulted in a large order for additional equipment from the West End.

BOSTON CONDUIT EXPERIMENT WAS NOTEWORTHY

MR. SPRAGUE'S reference to the Bentley-Knight conduit system deserves to be expanded because of the conspicuous character of the experiment. Its significance is clearly set forth in an article written in August, 1899, by F. S. Pearson, then chief engineer of the great Metropolitan Street Railway in New York, who earlier had been chief engineer of the West End Street Railway in Boston. After explaining the construction of the Bentley-Knight system, in which a contact plow under the car and passing through a slot into the conduit made contact with two electric conductors carried on insulators on the sides of the conduit, Mr. Pearson continued: "The Boston conduit was constructed for the West End Street Railway Company, of Boston, one of the first roads to adopt electricity as a motive power, and the first large road to undertake the equipment of its lines for electric operation.

"After about six months' operation, which was a series of almost daily failures and troubles, this conduit was abandoned and the officers of the company and the public at large were thoroughly convinced that it was impossible to build and operate an underground conduit road successfully. Inasmuch as the West



Street Railway Journal

SECTION OF BENTLEY-KNIGHT CONDUIT AS LAID IN BOSTON

The conduit was located alongside of, and outside of one of the running, or tram rails

End Street Railway Company was at that time the largest street railway system in the world, both in track mileage and number of cars in operation, the signal failure of the underground system effectually stopped all further progress in this direction, and the city authorities, recognizing the great advantages of electrical traction to the people, very wisely granted permission to construct overhead trolley lines throughout the city of Boston.”

In justice to the Bentley-Knight conduit system it is only fair to quote as follows from the report on street and electric railways made by the United States Bureau of the Census in 1902. The quotation is from a special article on the history and development of electric traction by the late T. C. Martin, expert special agent for the Bureau and an eminent editor and writer. Mr. Martin, after stating what had been done in Cleveland and New York with this conduit construction, wrote: “Another Bentley-Knight line was later constructed in Boston and remained in operation for some time, but it was finally superseded by trolley methods, although apparently it cannot be said that the relinquishment of the effort was due to any inherent fault of the underground conduit method. The time was simply not ripe for this development.”

The West End Era in Local Transportation

1887-1897

TO UNDERSTAND what was going on in the street railway business in Boston at the time of the formation of the West End it is necessary to have as a background the situation in other large cities.

STREET RAILWAYS IN THE LATE EIGHTIES

In 1888 there were about 6,000 miles of street railway in the United States, of which 5,474 miles were horse operated, and 86 miles were electrically operated. Of the balance, cable street railways had 217 miles of track and on 216 miles steam "dummies", or tiny locomotives, furnished the motive power. As to street railway cars, 21,736 were drawn by horses, 2,777 were cable cars, 258 were steam-propelled and only 66 were electric motor cars. The average length of the horse railways was 9.67 miles, and that of the few electric railways was 4.09 miles.

The following word picture of the street railway scene of this period will serve as a background for the statistics. It was sketched years ago, with accuracy and with sympathy by the editor of *Aera*, a magazine formerly published by the American Electric Railway Association (now the American Transit Association). Of the street railways of 1889 he wrote: "It was a brilliant and colorful period in street railway history. Tremendous strides had been made in motive power, in organization and in public recognition of this particular phase in civic development. A bitter struggle for franchises was under way; the first of the great consolidations, that of a group of Boston lines into the West End Street Railway, the parent company of the Boston Elevated system, had been effected, and the struggle for supremacy between the two leading manufacturers of electrical equipment, the Thomson-Houston and the Sprague companies, had reached its peak. A veritable 'boom' in street railway promotion was in progress. In dozens of cities syndicates were being formed to build and equip street railways; capitalists and banking groups were being approached from all sides with glittering schemes for the flotation of transportation enterprises. Throughout the land, the ques-



THE ALLSTON POWER PLANT

tion was not so much ‘Can we afford to support a street railway?’ as ‘Which system shall we adopt — and how many?’ For the idea that local transportation was a natural monopoly and could be better handled by a single organization, had not, at that period, been born.

“Electricity, long talked of as a motive power, derided, scoffed at, and legislated against,

had gained powerful advocates, and the old guard of horse-car and cable operators was preparing to make a final stand.” Elsewhere the editor states that at a convention of the street railway men one of the delegates demanded with some asperity that all this talk about electricity as a motive power be dropped; that he came to the convention with a serious purpose in mind and that purpose was to learn more about horse cars. However, more than two years before Mr. Whitney selected electricity for Boston a committee of street railway men had reported: “The application of electricity to the propulsion of street cars is entirely feasible.” Favoring electricity as against the horse was an epidemic of epizootic which swept some of the Eastern cities and carried off thousands of horses.

LOCAL MEN ACTIVE IN NATIONAL ASSOCIATION

ON page 63 the American Electric Railway Association was mentioned. This was the successor of the American Street Railway Association, which was just getting into its stride during the early days of the West End. The Street Railway Association had been organized in Boston in 1882. An indication of the high esteem in which the local railways were held is given by the selection of this city for the organization meeting.

This meeting was held in Young’s Hotel, Dec. 12 and 13, 1882, and was attended by representative operators from many parts of the country. The arrangements for the meeting were made by Julius E. Rugg,* then superintendent of the Highland Street Railway of Boston. Hon. Moody Merrill, president of the Highland Company, presided.

Considerable credit for the initiation of the movement must be accorded to Daniel F. Longstreet, at the time secretary and treas-

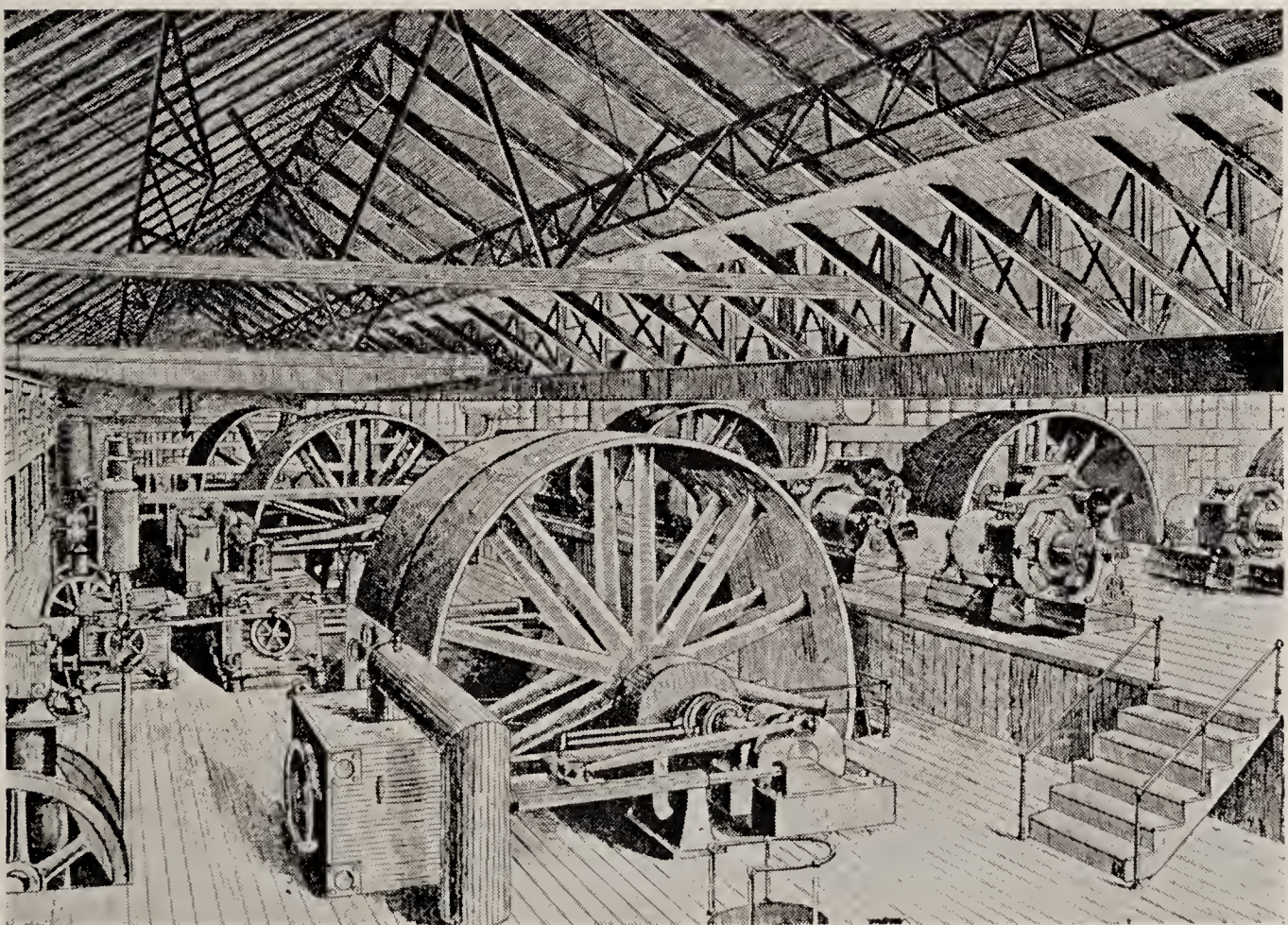
*A portrait of Mr. Rugg appears on page 12.

urer of the Union Railroad Company of Providence, R. I., and a few years later called to Boston to manage the lines which were consolidated as the West End Street Railway. Mr. Longstreet was elected a member of the executive committee of the new association. Soon after the formation of the Association he served as chairman of the committee on rules governing conductors and drivers.

Calvin A. Richards,* president of the Metropolitan Railroad Company, of Boston, was elected a vice-president at the organization meeting and two years later became president. Mr. Rugg was 1st vice-president of the Association at the time of the formation of the West End in 1887. While Mr. Longstreet was general manager of the West End he naturally continued his interest. A few years later, after he had left Boston for Denver, Colo., he became president of the Association.

The interest in the national association, manifested thus early, has continued to the present day. Never were the officials of the Boston Elevated more active in its affairs than they have been during the past few years.

The American Street Railway Association gave the scattered street railway industry, if it can be termed such, a feeling of unity. A primary purpose at the time was social, but there were many



Street Railway Journal

THE WEST END'S GREAT CENTRAL POWER STATION AS FIRST CONSTRUCTED

*A portrait of Mr. Richards appears on page 12.

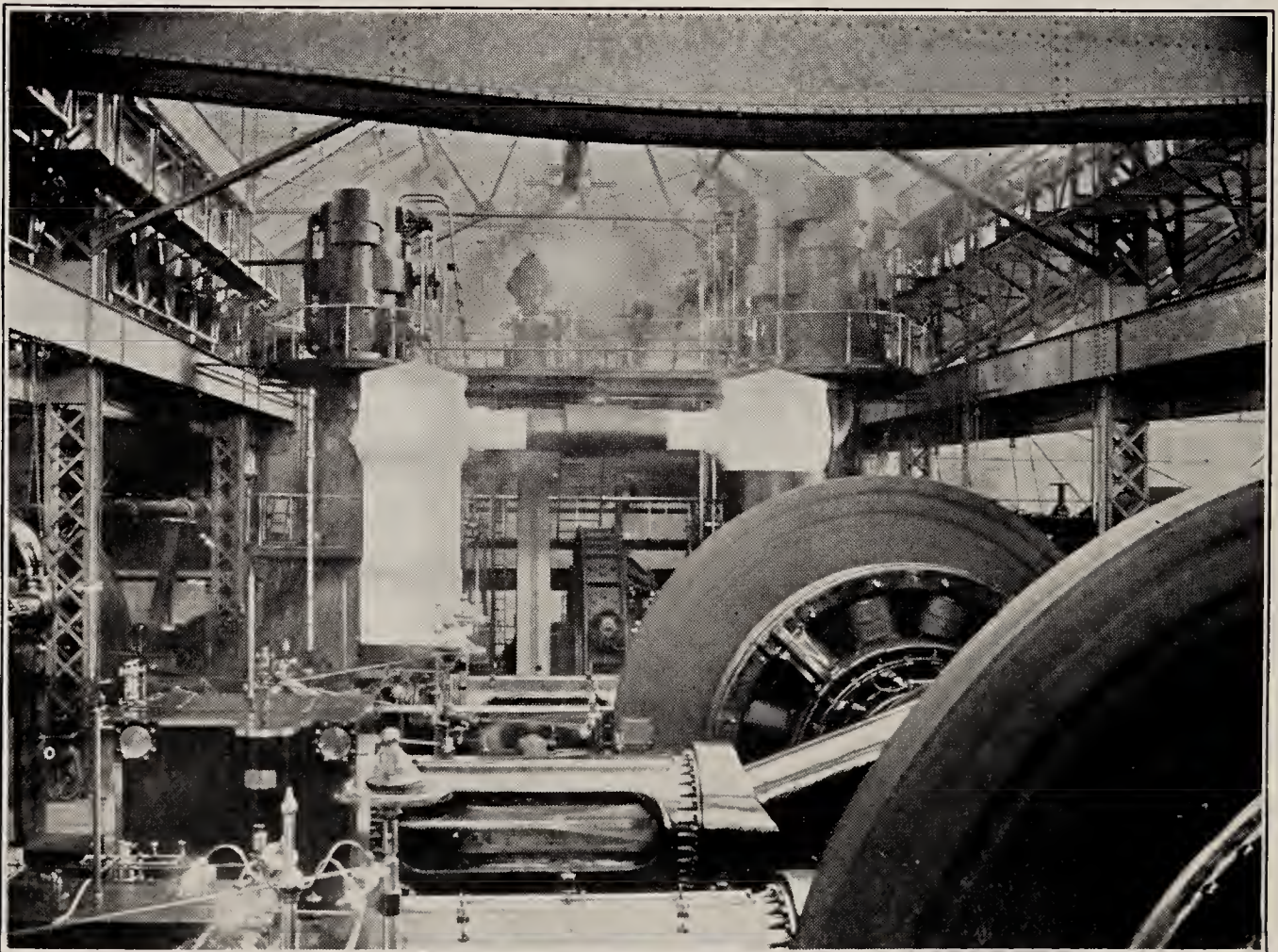
administrative matters ripe for discussion. It is amusing now to re-examine the records of the early days of the Association and to read about the topics then considered essential to the success of the business. For example, a leading operator, in discussing the color of horses for street railway work, said:

I am convinced in my own mind that nothing will average equal to the roan, so far as you can get it, from the strawberry roan to the steel roan. A dark gray is good, and there is nothing better than a dark dun with a black stripe down the back, and black legs. Dark grays are also good; what is known as a flea-bitten gray, little specks all over him, is generally very good. If you can avoid it never get a horse with a white hoof.

This quotation suggests that the horse, being conspicuous on the street and having to be maintained in good working condition, had to be selected with great care.

HOW THE POET VIEWED THE TROLLEY CAR

IN a poem written in 1890 by Dr. Oliver Wendell Holmes, who lived on Beacon street, Boston, he voiced the fanciful idea that Salem witches were the source of motive power for the new trolleys. His poem, first published in the *Atlantic Monthly*, was entitled "The Broomstick Train; or The Return of the Witches." After



THE WEST END'S POWER ENGINEERS EARLY MODERNIZED THE
CENTRAL POWER STATION

explaining in his whimsical way how the witches arose from their graves, as "they longed to visit the haunts of men and see the old dwellings they knew again and ride on their broomsticks all around their wide domain of unhallowed ground," he explained in the verses below* their relation to the trolley car, when the "Boss of the Beldams" ordered them to the job of replacing horses as motive power:

*They came, of course, at their master's call,
The witches, the broomsticks, the cats, and all;
He led the hags to a railway train
The horses were trying to drag in vain.
"Now, then," says he, "you've had your fun,
And here are the cars you've got to run.
The driver may just unhitch his team,
We don't want horses, we don't want steam;
You may keep your old black cats to hug,
But the loaded train you've got to lug."*

*Since then on many a car you'll see
A broomstick plain as plain can be;
On every stick there's a witch astride,—
The string you see to her leg is tied.
She will do a mischief if she can,
But the string is held by a careful man,
And whenever the evil-minded witch
Would cut some caper, he gives a twitch.
As for the hag, you can't see her,
But hark! You can hear her black cat's purr,
And now and then, as a car goes by,
You may catch a gleam from her wicked eye.
Often you've looked on a rushing train,
But just what moved it was not so plain.
It couldn't be those wires above,
For they could neither pull nor shove;
Where was the motor that made it go?
You couldn't guess, BUT NOW YOU KNOW!*

WEST END'S CONTRIBUTION TO POWER DEVELOPMENT

THE tiny pioneer Allston power plant, which was part of the Sprague electrification, produced power of course for only a few cars. The Railway also purchased power for a while from the Cambridge Electric Light Company and the Edison Electric Illuminating Company.

As soon as the Railway decided definitely to go into electrification on a large scale, the question of power supply became a dominant one. The prospective demand for power was for the time enormous. A central power supply was the logical answer.

* Excerpts used here by permission of Houghton Mifflin Company, publishers.

A tract of land, suitable for this purpose, lying between Albany street and Harrison avenue, was purchased from the Hinckley Locomotive Works in 1889, and plans for a great power station were at once prepared. On the South Bay Channel side of Albany street at this point a wharf was to be built for the reception of fuel, while water from the Channel was available for condensing purposes.

As a temporary power supply a small brick building, on the site when purchased, was utilized to house ten high-speed engines of 350 horsepower each. For the time these were large engines of the high-speed type. Each engine drove four 62-kilowatt, bipolar "dynamos," or forty in all. Later this was known as "Old Power Station No. 1"; it continued as a supplementary power source for many years.

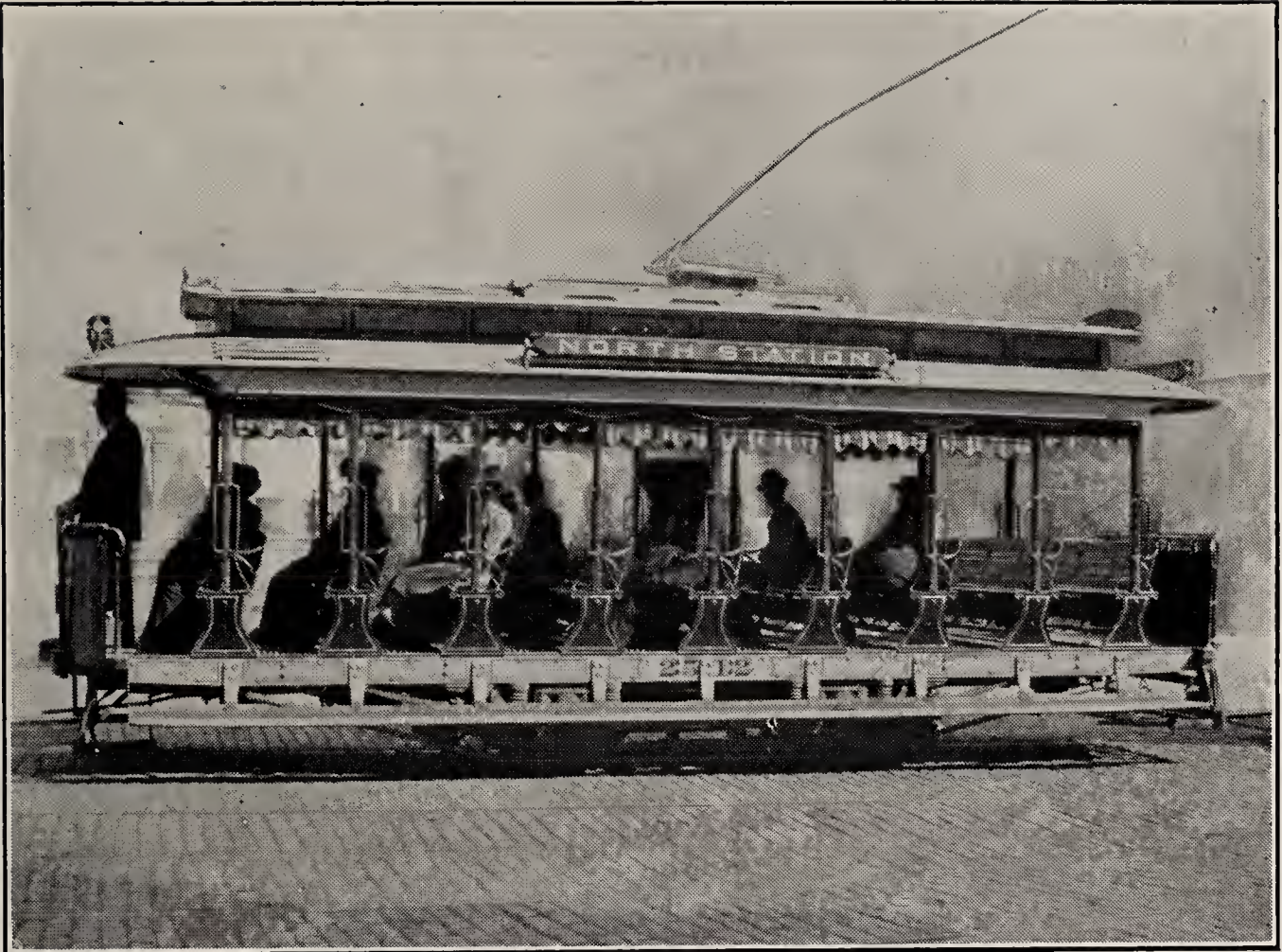
In the meantime construction of a large central power plant was pushed, and a smaller, modern-type plant was under construction in East Cambridge. All three of these, like the Allston plant, were necessarily direct-current power stations as alternating current had not yet been developed for railway power distribution. The name "Central Power Station" was given to this large power plant.

In his report to the stockholders dated Nov. 12, 1891, Mr. Whitney stated:

On October 14th (i.e., 1891), the Jamaica Plain line, and, on October 24, the remainder of the cars on Tremont street, numbering in all, seventy-eight cars, were started by power from the permanent plant; and it is expected that by the 1st of January the demands for electric power will be fully met from the permanent plant.

The illustration on page 65, reproduced from the *Street Railway Journal* (later the *Electric Railway Journal* and now the *Transit Journal*) shows how the engines and "dynamos" were located in the original, main Central Power Station. This layout was designed for twelve Corliss engines of a size considered tremendous at the time. They could produce 2,000 horsepower each, and were of the triple-expansion type equipped with surface condensers, steam-heated receivers between the cylinders, and other up-to-date auxiliaries. Provision was made for circulating up to 20,000,000 gallons of condensing water per day.

The "dynamos," of 500-horsepower capacity each, were in four parallel rows on an elevated floor and belt-driven from countershafts below. The countershafts, of course, were driven by the engines. Belt-tightners were used to permit the "dynamos" to be disconnected from the countershafts and to increase the contact



THE CROSS-BENCH OPEN CAR WAS POPULAR IN SUMMER IN WEST END DAYS
AND LATER

area between the belt and the flywheels and pulleys. Belt-tighteners also were provided between the engine flywheels and the countershafts. Clutches on the countershafts permitted the transfer of the load from one engine to another.

In the boiler room were twelve batteries of Babcock & Wilcox water-tube boilers, of two boilers each, with a total capacity of 24,000 horsepower at the engines. These were hand-fired, as was the practise of the time, but mechanical ash-handling apparatus was installed under the boilers. The chimney, referred to at the time as "monumental," was built to a height of 252 feet, or 30 feet higher than the Bunker Hill Monument. On page 66 is a view taken in Central Power Station after a few years, when the process of modernization had already begun.

The Central Power Station building (still standing in 1937, although divested of its equipment) covered a large area because the individual boiler, engine and "dynamo" units, although extremely large for their day, were of small capacity judged by present-day standards. Hence a large number of each was necessary. The original boiler section was over 160 by nearly 85 feet in size (later enlarged) and the engine and "dynamo" section ap-

proximately 173 by 146 feet. The total ground area covered by the building was greater than an acre.

This station was rated as the largest in the world when built and it attracted world-wide attention. It was provided with all of the heat-conserving devices favorably known at the time including "economizers" or boiler feed-water heaters located in the path of the chimney gases.

The great leather belts, which were necessary in transmitting the power from the engines to the "dynamos," were 54 inches wide and 150 feet long, two to an engine. The Railway's order for belting was understood to be the largest ever given to a belt manufacturer.

These superlatives, although applying to long-outmoded machinery, are restated now, more than 45 years after Central Power Station was built, only to impress upon Elevated employees the intrepidity of the spirit of the management and financial backers in those pioneer days.

MR. WHITNEY VISUALIZED THE NEED FOR GETTING RAILWAY OFF THE STREET

FROM the inception of the greater street railway system for Boston and vicinity, Mr. Whitney realized that street congestion by the numerous horse cars and other vehicles would seriously impede service. In a petition presented to the General Court in March, 1887, on behalf of the Railway, he stated: "That the streets of Boston are and have for a long time been overcrowded with cars and vehicles, and that to remove or diminish the difficulties arising therefrom, and to furnish such further accommodations as the public requires, it has become necessary to construct tunnels under Boston Common and under Beacon Hill, so-called,



SALEM STREET CARHOUSE, MEDFORD, WAS MUCH LARGER IN WEST END DAYS
THAN IT IS TODAY

in said City of Boston, running to some central point near Tremont and Park streets, and diverging in various directions to different portions of said City.

"Your petitioner," continued Mr. Whitney's statement, "further represents that it believes that improvements have recently been made in the use of electricity as a motor which render it practicable to use the same in the operating of street railways."*

The Act, approved June 15, 1887, which permitted the consolidation of the street railway companies to form the West End "and any corporation formed by consolidation under this act" also sanctioned the construction of tunnels, with the consent of the board of aldermen and the board of railroad commissioners. The company was permitted, under specified restrictions, to "locate, construct and maintain one or more tunnels between convenient points in said city in one or more directions under the squares, streets, ways and places . . . and under public and private lands, estates and premises in said city, etc." Sect. 7 stated: "No location shall be granted upon and no tunnel shall be constructed under Boston Common under this act."

The West End did not actually construct tunnels under this act, because, as a practical matter it was found to be better public policy for the City to do the work and lease the tunnels to the West End. Another Act, approved June 10, 1893, provided for this construction, to be under the direction of a Board of Subway Commissioners.† On Dec. 7, 1896, a 20-year lease was signed by all parties concerned for the operation of the Tremont street subway by the West End and on Sept. 1, 1897, the first section from Church street to Park street was opened. Next, the section from Pleasant street to Park street was opened on Oct. 1.**

On the same day that the second section of the subway was opened a lease of the property by the Boston Elevated Railway, which had been incorporated July 2, 1894, became effective. The

* In this petition Mr. Whitney also had an important paragraph as follows: "Your petitioner further represents that it believes it is desirable for the better accommodation of the public, that there should be uniformity of practice in the matter of granting locations for street and other railways in the Cities of Boston, Cambridge, Somerville, Chelsea, Newton, and in the Town of Brookline, and that all locations within said Cities and Towns should hereafter be approved by the Board of Railroad Commissioners of this Commonwealth."

† No subway was ever constructed under the Act of 1893. The first subway was built under the statutes of 1894, Chap. 548, approved July 2, 1894, and accepted at a special election held July 24, 1894.

** The subway was not constructed without opposition. Quoting from an article by H. I. Harriman in "Fifty Years of Boston," published by the City of Boston: "A petition circulated in April of 1894 and signed by many merchants and citizens declared that the petitioners were 'unalterably opposed to the construction of any subway in any portion of the City of Boston, whether for the alleged purpose of accommodating surface or elevated roads, or both, being convinced that such construction would seriously interfere with travel and traffic, proving ruinous to hundreds of merchants and in the end failing to relieve congestion or promote rapid transit.' So complete, however, was the public favor won by this project that never again was it necessary to argue the general desirability of a subway or tunnel as a means of transportation."

Elevated took possession Dec. 30, 1897. It was not until Sept. 3, 1898, that the last section of the Tremont street subway was opened, i.e., that from Park street to North Station.

WEST END CONTEMPLATED ELEVATED LINES

IN his report to the West End stockholders dated Nov. 13, 1890, and covering the fiscal year ended Sept. 30, Mr. Whitney explained the coming need for real rapid transit. After outlining the general situation he proceeded to details as follows: "Your directors decided at the last session of the Legislature to present a petition for an elevated railroad. They made an application, and have received a charter. . . . Your directors feel that the increasing demands for transportation can be met in no other way than by an elevated railroad. If travel should increase within the next few years as it has during the last fiscal year, and is now increasing, provision must be made for a large increase in the means of transportation. The increased earning due to this increased traffic, together with the saving of time and other economies in the electric system, fairly justify the Company in undertaking to build an elevated railroad."

In his report Mr. Whitney referred to a charter for an elevated railroad.* The General Court approved an act covering this matter in detail, the approval being dated July 2, 1890. It was entitled: "An Act to Authorize the West End Street Railway Company to Build Elevated Railroads." Sect. 1 of the Act† stated:

The West End Street Railway Company is hereby authorized from time to time to construct, equip, maintain and operate, as hereinafter provided, a system of elevated railroads in the city of Boston and in the other cities and towns in which it is now authorized to run cars; and may also from time to time extend the system in such cities and towns, and at convenient places connect the tracks of said elevated railroads with the surface or other tracks of said railway company by the construction and use of inclined planes.

This act specified in detail the procedure under which the railway structures should be located, the examinations to which they would be subjected by the Railroad Commission, the methods to be followed in compensating property owners for damages, the

* Mr. Whitney's idea of an elevated railroad had been anticipated as early as 1879, when the elevated lines in New York, operated with steam locomotives, were the only ones of this type in the country. Senate Document No. 190, dated March 12, 1879, occupying over 250 pages in the record, contains the story of a petition for permission to establish elevated lines in Boston. Although the verdict was "leave to withdraw," much information on the subject was brought out in hearings before the committee on street railways. Hon. Moody Merrill, president of the Highland Street Railway, led the opposition. It was proposed to operate the trains by compressed air. The testimony convinced the committee that Boston did not need elevated railroads at that time. Electric operation was, of course, unthought of at the time.

† Acts of 1890, Chap. 454.

were radically different, geographically and with respect to the relative locations of the business and residence sections.

That city, states the report, referring to New York, "consists of a long and narrow strip of land, averaging about a mile and a half to two miles wide, and about sixteen miles in length. The greater part of the City is laid out in broad parallel avenues extending from north to south, with cross-streets at right angles to these avenues. The business portion of the City is at the lower end of New York island: probably two-thirds of the heaviest commercial and jobbing interests are concentrated below Chambers street, and probably at least two-thirds of the money made in New York is made within that limit. . . .

Within the territory referred to in the City of New York there are comparatively few residences, and no steam-railroad station on the island



THE WEST END TRANSPORTED MANY PASSENGERS DAILY TO THE PROVIDENCE DEPOT
OF THE OLD COLONY RAILROAD IN PARK SQUARE
(The Statler office building now occupies the station building site)

within a distance of four miles. . . . The upper parts of the island were not considered desirable places of residence, and had been left as farming-land in a great measure, because of the lack of rapid transit, and the superior facilities in the way of residence afforded by places across the river, in Brooklyn, Jersey City, and other outlying towns. It was to build up this distant territory of New York, and retain within it the population which did business in the City, that the elevated railway was contrived as a means of rapid transit.

The committee was not convinced that the New York elevated lines had as yet demonstrated their safety and durability. Besides, stated the report, "no complaints have been made that the citizens of the City of Boston and vicinity are not provided with reasonable facilities for getting to and from their places of business. . . . The street-railway facilities of the City of Boston are at present exceedingly good, and no complaints were made against any of the companies for not performing their full duty to the public."

The question of damages also came in for attention, since there was no assurance at the time under Massachusetts law that holders of abutting property would be protected against depreciation of value by reason of the overhead structures.

A further complication noted by the committee was that in Boston an elevated line would have to cross waterways on draw-bridges, a very dubious proposition.

Summarizing the two petitions the committee pointed out the following significant facts: ,

The Bigelow* petition was signed by three gentlemen, who, so far as appeared in the hearings, had no special interest in the city of Boston, save to get a charter which they believed would be of great value to themselves firstly, and secondly to the public who might use the road if constructed.

The Powers† petition represented large interests and property in Boston, mainly in the street and steam railways. It was evidently presented as a measure of protection against the attempted intrusion of other parties, —against a novel rival in the transportation of passengers in the streets.

From the last statements we exclude the leading petitioner and one or two associates, who apparently sincerely believe in elevated railways for Boston, and really desire to construct the same.

The cases for both petitions were candidly and ably presented, while all the witnesses on behalf of each appeared to be pecuniarily interested in the success of one scheme or the other. The Bigelow bill as proposed left the whole matter of location to the local authorities. The Powers petition asked for a certain location; and, as a result, the property-holding remonstrants are found mainly upon the designated streets.

* The leading petitioner was L. A. Bigelow.

† The leading petitioner was Charles E. Powers.



WEST END TRACKS CAN BE SEEN HERE IN FRONT OF THE NEW YORK & NEW ENGLAND RAILROAD STATION ON THE SITE OF THE PRESENT SOUTH STATION

CENTRAL-RAIL PLAN PROPOSED

OF the two 1879 petitions for a charter, the Powers petition proposed to use "the central-rail plan" of construction, a rail on a row of single iron columns. Or, if the City disapproved of this plan, then a single track of not more than 36-inch gage was proposed. Compressed air was to furnish the motive power. Of this proposal the committee stated: "The single-rail railroad, it was confessed, was an experiment, and compressed air was comparatively untried for locomotive purposes. In a scheme of this magnitude, we do not think that any part, and particularly the three most important parts,—the roadway, the motive power, and the carriages—should be experimental."

The single-rail plan thus properly dismissed at the time was to come up later and to be given serious consideration by the Massachusetts lawmakers. It promised less overhead obstruction than what was later referred to as the Manhattan type, a type which was specifically disapproved.

THE MEIGS PLAN FOR ELEVATED RAILWAYS IN BOSTON

IN March, 1884, five years after the Legislature's disapproval of petitions for a charter for elevated railways in Boston, an Act was approved incorporating the Meigs Elevated Railway Company.

This company was authorized to build a line connecting "some point in the city of Cambridge and Bowdoin square in the City of Boston." The rights of the communities and of property owners were fully protected, the method of petitioning for assessment of damages being specified. †

While somewhat general as to the route of the Railway, the Act was specific in several important matters. To illustrate:

Section 2. The amount of its capital stock shall not be less than one hundred thousand dollars for each mile of road. Not less than ten per cent. of said stock shall be paid in before a certificate of incorporation is issued, and the whole capital stock shall be paid in cash before the construction of the road shall be commenced.

Section 5. The Meigs elevated railway shall not be built after the manner of the New York elevated railways, but shall be built according to the plans, methods and inventions of Joe V. Meigs, a copy of which shall be filed with the secretary of state within sixty days of the passage of this act; and upon granting a location, the board of aldermen shall prescribe the height at which the lowest part of the girder shall be above the ground, and the width of the track, provided that its greatest width shall not exceed twenty-two and one-half inches.

The passage of the Act implies that the legislators had come to the conclusion that a trial of rapid-transit on a small scale was warranted. This conclusion was reinforced by a ruling of the Board of Railroad Commissions on June 6, 1884 as follows:*



THE MEIGS ELEVATED RAILROAD IN EAST CAMBRIDGE WAS A FULL-SIZE OPERATING
DEMONSTRATION EXHIBIT
(The size is indicated by the men on the platforms)

† The incorporators named in the Act were Joe V. Meigs, William S. Butler and thirteen others. The Act constitutes Chap. 87 of the "Acts and Resolves" for 1884.

In addition to specific matters covered in this Act, it was stated that, with exceptions specified, this incorporation was subject to Public Statutes, Chap. 113, and acts in addition thereto, i.e. to the law governing street railways.

* Report of Railroad Commission, January, 1885, page 169.

CERTIFICATE OF EXIGENCY FOR MEIGS ELEVATED RAILWAY

ON the application of the directors under the articles of association to form the Meigs Elevated Railway Company for a certificate that public convenience and necessity require construction, the legislature has left little for this Board to decide. Nothing is before us at this time except the question whether better facilities are needed for the transportation of passengers between Boston and Cambridge, and whether within three miles of the State House such facilities shall be afforded by the use of steam. If they are needed the legislature has determined that they shall be furnished by Mr. Meigs and his associates, and furnished according to his method. To insure this the unusual precaution has been taken of forbidding another method by name; and as a further security a copy of Mr. Meigs' plan must be filed with the "Secretary of State," so that it shall be followed in constructing this road.

The testimony shows clearly the need of improved transportation between the two cities; and no other motor than steam is proposed or practicable on the contemplated road. The Board, therefore, grants the petition and certifies that public convenience and necessity require the construction of a railway as proposed in the articles of association aforesaid. And the Board also consents that any part of said railway situated within three miles of the State House may be located and constructed.

MEIGS ELEVATED RAILWAY TESTED FOR RAILROAD COMMISSION

FOLLOWING the incorporation of the Meigs Elevated Railway Company by the Legislature in 1884, the Company proceeded to demonstrate the practicability of the Meigs inventions. A full-size working model of elevated structure and train, designed by competent engineers, was installed in East Cambridge, on made land, upon what was once the bed of Miller's River, and crossing Bridge Street.

In due course, under the provisions of the act of incorporation, and when the working exhibit had been completed, the Railroad Commission, on Oct. 27, 1886, appointed an eminent civil engineer, Gen. George Stark, to make a thorough examination of it. He was charged with "examining the safety and strength of the structure of the Meigs Elevated Railway, so-called, in Cambridge and the rolling-stock and motive power used thereon, and of approving or disapproving the same." General Stark made a thorough study of the exhibit, including tests of the deflection of the structure under rolling load and wind stresses. With recommendations as to improvements in minor details, made later, he approved the design and construction.

The essentials of the Cambridge installation were these: A single longitudinal truss structure was supported at intervals on iron columns of suitable height, firmly anchored in concrete foundations. A train, consisting of steam locomotive, tender and commodious passenger car, was carried centrally above the truss on trucks of this unique design: The weight of the train was supported on large, grooved-rim wheels, with axles set at 45 degrees to the horizontal, and rolling on rails fastened to the lower chord of the truss. To insure proper sidewise stability the truck on top carried horizontal wheels which rolled on the sides of a rectangular rail mounted on top of the truss structure. In the locomotive the horizontal wheels were also the driving wheels, power being furnished by steam engines mounted horizontally on the truck.

While the exhibit train was cylindrical in cross-section, and hence unusual in appearance, this feature was incidental. The details of control, braking, etc., were not essentially different from other steam equipment. The experimental track structure was designed and built to include sharper curves and steeper grades than would be ordinarily found under practical operating conditions in rapid transit.

RAPID TRANSIT COMMISSION APPOINTED

AGITATION for improved transportation facilities in the Boston district and for a thorough-going study of the whole situation led to the passage of an appropriate bill by the Legislature in 1891. This established "a commission to promote rapid transit for the city of Boston and its suburbs." *

The Rapid Transit Commission went at its task in a systematic manner, utilizing the experience of other cities and the best available engineering practice. Two members (Messrs. Fitzgerald and Howes) were sent abroad in the summer of 1891 to collect data and other facts at first hand. More than fifty hearings were held and many devices for use in rapid-transit were submitted and given careful consideration.

The Meigs plan was among these and, also, to quote the Commission's report, "an ingenious and attractive study for a combined

* Statutes of 1891, Chap. 365. The commission was dissolved by act of Legislature in 1892, after its comprehensive report had been presented. Personnel of the Commission included: (Ex-officiis) Nathan Matthews, Mayor of Boston; William Jackson, city engineer; (appointed by the Governor), John Quincy Adams, Quincy; Chester W. Kingsley, Cambridge; Osborne Howes, Jr., Brookline; (appointed by the Mayor), Henry L. Higginson, James B. Richardson, John E. Fitzgerald, all of Boston. Horace M. Jordan was secretary of the Commission, and George S. Rice, was chief engineer. The consulting engineers were Theodore Cooper and Alphonse Fteley, New York and Frederic P. Stearns, Boston. Chap. 365 suspended the Act of 1890, Chap. 454, under which the West End Street Railway Company was authorized to build elevated railroads.

light subway, tunnel and elevated structure, carried on single posts in the broad streets and designed for electric street cars," which the West End Street Railway presented. It will be remembered that the West End had a year earlier been authorized to build elevated railroads, but this privilege had been suspended.

COMMISSION'S REPORT SUMMARIZED

THE report of the Commission may be considered as laying the foundation for future developments and outlining certain fundamental principles. This is indicated by the following brief summary:

The Commission assumed its territory to comprise the 27 municipalities located within a 10-mile radius of City Hall, in which about 850,000 persons dwelt. This area the Commission termed the Metropolitan District.

The Commission recommended, for the steam railroads, two union stations, the South Union Station and the North Union Station.

As to street conditions, a new and thorough readjustment of street lines was recommended, including drastic widenings and new street locations. At the same time the street railways* were to reorganize their lines to take advantage of the street improvements and to avoid duplication of services.

The trend of street railway traffic at this time was indicated by the Commission's statement that in 1871 the street railways in the 10-mile district had carried 34,000,000 people. In 1881, the number was 68,000,000 and in 1891, 136,000,000. "In other words," stated the Commission, "the traffic doubles in each decade."

The Commission advised the construction of a tunnel under the Common and Tremont street to reduce the increasing congestion in the downtown district. Two complete elevated lines were suggested, a South Boston-Charlestown line, and a Roxbury-Cambridge line, with connection at Causeway and Eliot streets.

All of these recommendations were worked out in great detail, with designs of elevated structure for differing width of streets, of passenger stations and of subways, with specific necessary property takings for street improvements and other details.

The report of the Rapid Transit Commission was submitted to the Legislature of 1892 and was referred to the Legislature of 1893. That body created a large special committee to consider the whole subject, and hearings were held over several months. The public

* The electrification of the street railways had begun about three years before the appointment of the Commission and they were more than one-quarter electrified at this time.

press gave liberally of its news and editorial space to insure widespread interest.

The result was that two acts were passed in 1893. One provided for the creation of the Metropolitan Transit Commission and also for a new thoroughfare through the heart of the city to run between Washington and Tremont streets and from Causeway street to Franklin Park. This was popularly known as the "Alley route." The plan was rejected by the voters at the State election of 1893.

THE SUBWAY COMMISSION

THE second act of 1893, resulting from the work of the special legislative committee, provided for a Board of Subway Commissioners.* This act, subject to approval by the City Council of Boston was duly approved by that body. On Jan. 1, 1894, Charles H. Dalton, Thomas J. Gorgan and George F. Swain were appointed members of the Commission.

The Subway Commission started its work with this background: When incorporated in 1887 the West End Street Railway had been authorized, subject to ratification of plans by the Railroad Commission and the Boston Board of Aldermen, to "locate, construct and maintain one or more tunnels between convenient points in said city (i.e., Boston) in one or more directions under squares, streets, ways and places, etc."

No tunnels were constructed under this act, but four years after the West End incorporation the special Rapid Transit Commission included subways as part of its assignment. As already explained the Commission recommended a definite subway proposition to relieve the most urgent congestion.

By an act of the Legislature, the Rapid Transit Commission went out of existence in 1892 but its recommendation for a Tremont street tunnel was passed on to the new subway board. The Board was authorized to construct a subway to "extend through Tremont street, and lands adjacent thereto, excepting Boston Common, from a point or points at or near the junction of Tremont and Pleasant streets to Scollay square, and may continue through Court street or other streets and lands near Scollay square to a point or points where, in the judgment of said board, a suitable and advantageous exit to connect with surface tracks may be obtained."

The Board of Subway Commissioners attacked its assignments promptly and vigorously. Suggestions were made as to modifications desirable in the act under which the Commission was

* See Chap. 478, Statutes of 1893, approved June 10, 1893.

created. The result was the appointment of a Joint Special Commission of the Legislature to consider the whole problem. Many hearings were held by this Commission and the Committee on Finance. Finally a composite bill emerged, covering two matters entirely unrelated except that both had to do with the subject of transportation.

The title of this legislation of 1894 was: "An Act to Incorporate the Boston Elevated Railway Company and to Promote Rapid Transit in the City of Boston and Vicinity." It was submitted to the voters at a special election on July 24, 1894, and accepted.

THE BOSTON TRANSIT COMMISSION

REFERRING first to the second part of the Act, it provided for the Boston Transit Commission, with authority to construct specified subways, tunnels and bridges and to finance the construction within stated limitations. The Commission was to comprise two appointees of the Governor and the three members of the Board of Subway Commissioners appointed Jan. 1, 1894.

On July 26, 1894, Gov. Frederic T. Grenehalge appointed George C. Crocker and Albert C. Burrage to the Commission, and on Aug. 15 it organized with Mr. Crocker as chairman. Howard A. Carson, civil engineer, then chief engineer of the Metropolitan Sewerage Commission, was appointed chief engineer of the subway board. Henry H. Carter, then superintendent of streets of Boston, was selected as consulting engineer.

The story of this commission's activities will be continued, but, first, the part of the 1894 Act providing for the incorporation of the Boston Elevated will have attention. The incorporators named in the Act were Joe V. Meigs, Wm. S. Butler and others, different men (except for Messrs. Meigs and Butler) from those named earlier as incorporators of the Meigs Elevated Railway Company.*

The Meigs plan of 1884, presumably for lack of capital, did not get farther than the demonstration stage, and plans for the Cambridge-Bowdoin square line came to naught. As indicated by the 1894 incorporation Capt. Meigs still had hopes of putting his inventions to work.

During the intervening ten years the magnitude of the elevated railway proposition had become evident, because the 1894 act specifies a minimum capital of \$10,000,000 and a maximum of \$20,000,000, with the privilege of issuing coupon or registered bonds to a total amount not exceeding in all the capital stock paid in at the time.

* This company was dissolved by the Legislature in 1893; Statutes of 1893, Chap. 215.

A slight modification of the original restrictions as to type of construction appeared in the 1894 Act. To quote Sect. 6: "Said corporation may construct lines of elevated railway according to the plans or systems shown in the patents granted to Joe V. Meigs, or according to such other plans or systems, except the system now in use in New York, known as the Manhattan system, as the Board of Railroad Commissioners may approve, etc."

An elaborate system of routes was specified, much more comprehensive than later materialized.

Among the provisions of the Act the corporation was permitted, subject to approval by the Railroad Commission, to "lease, purchase, own and operate any lines of street or elevated railway which may be or become tributary to its lines."

However, in spite of the great privileges provided by the Legislature, financial limitations stood in the way of elevated railway promoters. It remained for a new group, which could command the necessary capital, to take the reins three years later, i.e., in 1897. Then the vast project emerged from the visionary stage and soon became a substantial reality.



HORSES DREW CARS ON MARLBORO STREET UNTIL
DEC. 24, 1900; LONG AFTER THEY WERE DISPLACED
ELSEWHERE

The Period of Private Operation of the Boston Elevated 1897-1918

THE BOSTON ELEVATED RAILWAY COMPANY was incorporated July 2, 1894, but due to the inability of the promoters to finance the construction of a projected rapid-transit system the franchise lay dormant for a while.

In December, 1895, however, J. Pierpont Morgan bought the "Meigs franchise", as the act of 1894 was frequently termed.* He in turn assigned a one-half interest to the bankers, Kidder, Peabody & Company, who interested other prominent local men in the project.

At a meeting of the new owners of the "Meigs franchise" held Apr. 10, 1896, the following were elected to the positions named.†

President, Col. Wm. A. Gaston

Vice-president, Jacob C. Rogers

Directors, Francis H. Peabody, Samuel Carr, J. M. Prendergast, Eben D. Jordan, Charles J. Paine, Frederick Ayer, T. Jefferson Coolidge, Jr., Wm. Endicott, Jr.

These men, who believed in rapid transit for Metropolitan Boston, realized that an elevated line probably would not be profitable as a separate proposition. It must be an integral part of the local transportation system. A lease of the West End Street Railway appeared necessary, not only to permit the necessary integration but to secure the use of the Tremont street subway. It was proposed to operate elevated trains through the subway, which had been built for surface cars.

The West End was a prosperous company and the stockholders were well satisfied with the management policies of President Samuel Little and his board of directors. Some of them looked upon the proposed lease as an invasion of their rights.

* See page 40 for a footnote reference to the inventor-promoter, Capt. Joe V. Meigs.

† The *Boston Globe* of Apr. 11, 1896, commented on these elections as follows: "All these gentlemen are well known in the business world as men of financial strength and ability. Mr. Gaston is the son of the late ex-governor of the state. Mr. Rogers is the personal representative of banker J. P. Morgan, who originally purchased the charter of the Boston Elevated Railway Company. Mr. Peabody is a member of the firm of Kidder, Peabody & Co., which was largely interested in the purchase of the Meigs charter. Mr. Carr is one of the trustees of the Fred. Ames estate. Mr. Prendergast is the representative of a large Washington bank and is interested in the cotton business. Mr. Jordan is the head of the firm of Jordan, Marsh & Co. Mr. Paine is a well-known yachtsman and capitalist. Mr. Ayer, who is at present in Europe, is a big mill owner in Lowell. Mr. Coolidge, now on his way from Europe, is president of the Old Colony Trust Company, and Mr. Endicott is connected with the firm of C. F. Hovey & Co."



COL. WM. A. GASTON
1897-1899



GEN. WM. A. BANCROFT
1899-1916



MATTHEW C. BRUSH
1916-1918

The Three Presidents of the Boston Elevated Railway
During the Period of Private Operation, 1897 to 1918.

The active proponents of the lease did not hold a controlling amount of West End stock. It was necessary to secure proxies for the annual election scheduled for Nov. 24, 1896. There was vigorous campaigning, pro and con. The vote at the meeting was 175,676 shares favoring the lease to 84,433 against.

COL. BANCROFT BECOMES VICE-PRESIDENT

IT was at this juncture in the proceedings that Col. William A. Bancroft*, who had several years earlier been roadmaster of the West End, became an influential official of the Elevated. He had resumed the practice of law in 1890, and was counsel for the Elevated Railway before his election.

This selection of Colonel Bancroft followed the second annual election of directors, held Jan. 11, 1897, when he and Robert Winsor were added to the board, the ten men previously mentioned being re-elected.†

These directors re-elected Mr. Gaston as president and elected Mr. Bancroft as vice-president.** Joseph Remick, of Kidder, Peabody & Company was appointed treasurer, and John T. Burnett, assistant postmaster of Boston, clerk.

In April, 1897, Ex-Attorney General Albert E. Pillsbury, on behalf of the Elevated Railway, gave the committee on street railways and metropolitan affairs of the Legislature three reasons why the Elevated Company believed that a lease of the West End was necessary. These were:

1. Elevated railways would not pay alone.
2. Only a subway made possible an elevated railway through the heart of the City, and the West End had a lease of the subway.
3. Public interest called for a combined system, otherwise two fares would have to be paid.

WHAT THE BOSTON ELEVATED WAS EMPOWERED TO DO

THE Legislature in due course enacted a bill "To Promote Rapid Transit in the City of Boston and Vicinity."‡ This title will be recognized as the second part of the title of Chap. 548, Statutes of 1894, under which the Boston Elevated Railway Company was incorporated.

* Colonel Bancroft was elected brigadier-general of the Second Brigade in July, 1897, and in May, 1898, was appointed brigadier-general of the United States Volunteers, and was in command of the second Brigade, 2nd Division, 7th Army Corps. A few years later, on the retired list, he had the rank of major-general.

† Of these new men on the board the *Boston Globe* stated: William A. Bancroft; ex-mayor of Cambridge and one of the best known public men in Massachusetts; a lawyer and prominent in all matters pertaining to the welfare of Cambridge. Robert Winsor; president of the Boston Tow Boat Company, a son of the ex-secretary of war, of high standing in social, legal and financial circles.

** Mr. Gaston served as president until Oct. 13, 1899, when he resigned but became chairman of the directors. He resigned from the board Oct. 1, 1902, to become a candidate for governor. General Bancroft was elected president, Oct. 13, 1899.

‡ Acts of 1897, Chap. 500. Approved June 10, 1897.

The "high spots" of the 1897 act included the following: Capital stock not less than \$10,000,000 or more than \$20,000,000, in \$100 shares; bonds not to exceed in amount the capital stock actually paid in; issue of securities to be approved by the Railroad Commission; construction of lines permissible if approved by the Railroad Commission, but steam power was excluded; an extensive choice of locations was permitted, with rights of municipalities safeguarded; all plans and safety of structures to be passed upon by the Railroad Commission; provision was made for recovery of damages; the West End lease was approved; a maximum rate of fare of 5 cents and free transfers were specified; provision was made for construction of a tunnel to East Boston.

WHAT THE BOSTON ELEVATED LEASED FROM THE WEST END

ON Dec. 9, 1897, the Boston Elevated entered into a lease with the West End, extending to June 22, 1922, and the lease was approved by the Railroad Commission on Dec. 15. The lessee took possession on Dec. 30, 1897. The lease was effective as of Oct. 1, 1897, but during the interim Oct. 1 to Dec. 30 the West End continued to operate the property at the risk, and for the benefit, of the lessee.

The Elevated contracted to pay the interest on the West End funded debt, taxes and dividends. Maintenance costs were to be carried by the Elevated, but additions and betterments chargeable to capital were to be cared for by the West End. The West End represented a cost, as of Sept. 30, 1897, of \$25,138,913.

The West End owned 2661 cars of simple design, including box cars and open cars. There were also more than 1100 service vehicles, comprising horse and electric snowplows (228), snow sleds (393) and miscellaneous. There were seven direct-current power houses, the later ones of modern design, with the necessary feeder system. In the streets there was a single-track mileage of more than 300 miles, a large part of the track built with girder rail, heavy for the time, weighing 70 to 100 pounds per yard. Most of the track was equipped with overhead trolley wires. There were excellent provisions for operating and caring for the cars in numerous carhouses and shops, well distributed over the system.

SOME PIONEERS OF THE "EL"

WITH the West End lease an accomplished fact and with the "Meigs franchise" duly revised, the Elevated management faced a task of great magnitude. In the first annual report of

the new company, for the year ended Sept. 30, 1898, President Gaston reported among other matters that more than 180,000,000 revenue passengers had been carried; that preliminary work had been done upon the elevated structure; that the completed subway had been in operation since Sept. 3, 1898, and that studies were under way to increase the subway capacity.

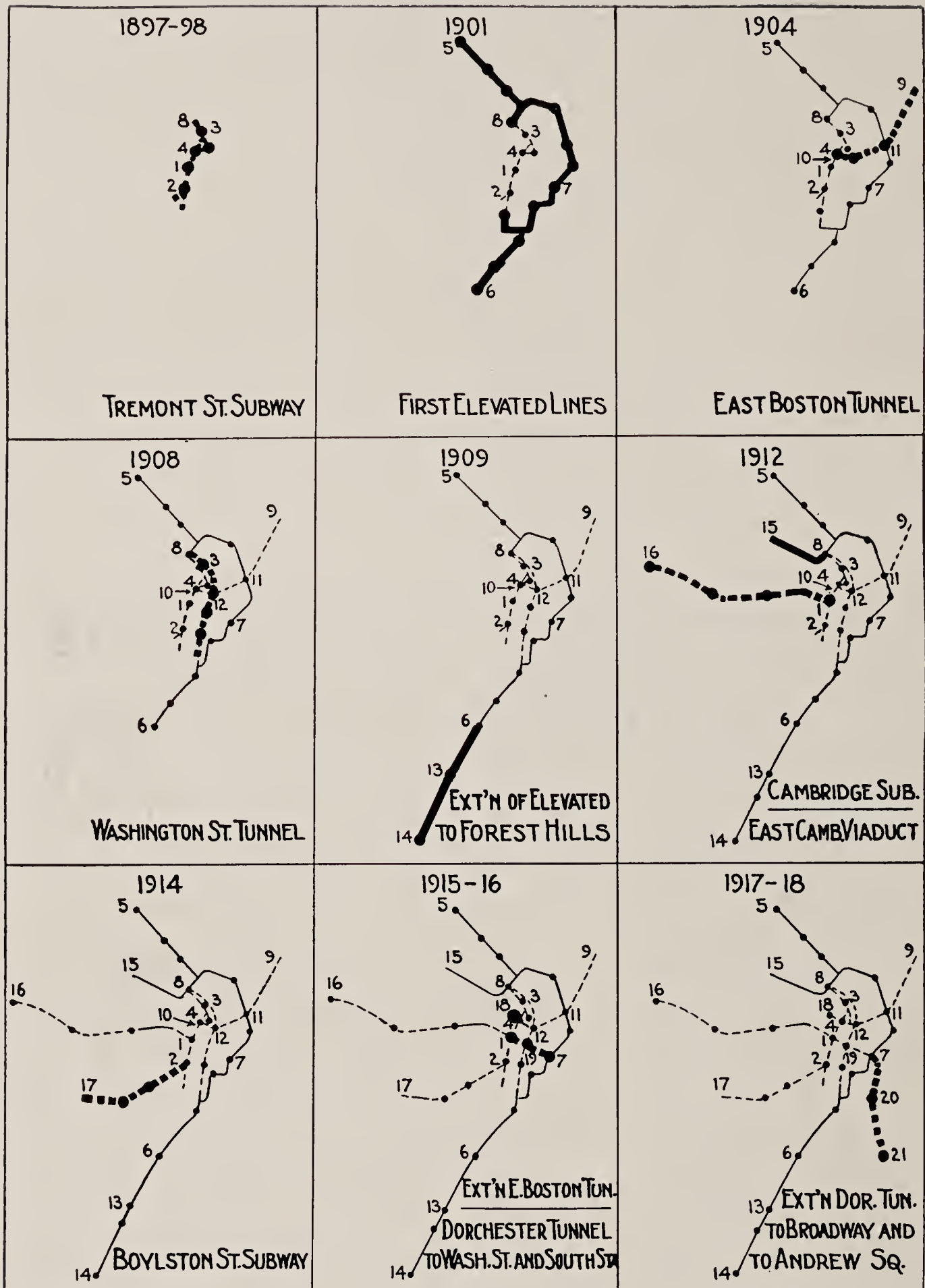
The management had the problem of operating and improving a vast surface system and at the same time of developing a radically different form of transportation, rapid transit. Then these two systems had to be co-ordinated. For these purposes Vice-president Bancroft's railway experience was invaluable to President Gaston. His election to the presidency on Oct. 13, 1899, when Mr. Gaston resigned, was in recognition of his demonstrated leadership.

Charles S. Sergeant, general manager of the West End, became second vice-president of the "El" and was in charge of operation



Boston Transit Commission

SCENE AT PARK AND TREMONT STREETS DURING SUBWAY CONSTRUCTION
In background is elevated conveyor used in connection with removal of excavated material



EVOLUTION OF THE SUBWAY-ELEVATED SYSTEM

Key to numbers: 1, Park Street; 2, Tremont Street; 3, Haymarket Square; 4, Scollay Square; 5, Sullivan Square; 6, Dudley Street; 7, South Station; 8, North Station; 9, Maverick Square; 10, Court Street (abandoned 1914); 11, State Street, Atlantic Avenue; 12, Milk Street, State Street; 13, Egleston Square; 14, Forest Hills; 15, Lechmere Square; 16, Harvard Square; 17, Kenmore Square; 18, Bowdoin Square; 19, Winter, Summer, Washington Streets; 20, Broadway; 21, Andrew Square.

Stations not numbered are indicated by dots. In the 1901 panel Thompson Square Station is so indicated, although it was not built until 1902. In panel 1912 and the following a dot between 13 and 14 represents Green Street Station, built in 1912. In panels 1901 and 1904 a dot below 2 indicates Pleasant Street Station (abandoned in 1908 when rapid-transit trains were transferred to the Washington Street tunnel.)

during the entire period covered by this section of the "history." He succeeded General Bancroft as vice-president. Closely associated with Mr. Sergeant were two young engineers, Paul Winsor (brother of Robert Winsor, one of the early "El" directors) and Charles H. Hile. Mr. Winsor had been assistant general manager of the West End, but when the Railway was leased by the "El" he became manager of an industrial concern. Mr. Sergeant, however, got him back as a technical assistant and he was for several years chief engineer of motive power and rolling-stock. Mr. Winsor remained active until about the time General Bancroft retired in 1916. Mr. Hile was engineer of underground conduit during the last few years of the West End period. He became superintendent of wires and conduits for the Boston Elevated, and later was made assistant to Mr. Sergeant. Following this, his title was "chief of maintenance" and he was responsible for maintenance of all buildings, including power stations, overhead wires, underground conduits, rolling-stock, tracks and signals.*

The auditor of the West End for most of its operating decade was Henry L. Wilson, and he continued as such with the "El."† The treasurer of the West End, Joseph H. Goodspeed, continued in that capacity with the "El."

In the West End organization all power generation and rolling-stock were under one head, Charles F. Baker, who a few years before had been master mechanic. Mr. Baker's title was "superintendent of motive power and machinery" and he retained this with the "El," resigning in 1905. He had a leading part in the development of the Railway's power stations. In Mr. Baker's department was a carhouse foreman who had been with the West End, John Lindall. He succeeded Mr. Baker, after having served first as general foreman of the elevated division shops and later as assistant superintendent of motive power and machinery.**

On Nov. 1, 1901, soon after the elevated division began operation, a long-service West End man, Herbert A. Pasho, was appointed its superintendent. Then 42 years of age, he had started with the Cambridge Railroad as conductor in 1885. His

* Mr. Sergeant retired Nov. 25, 1918. He died in Daytona, Fla., on Feb. 26, 1938, at the age of 86 years. Mr. Hile died on June 4, 1918, and Mr. Winsor on Dec. 10, 1936.

† Mr. Wilson later became successively comptroller and treasurer, continuing to serve the Railway until he retired Dec. 31, 1936, at the age of 74 years. (See also "Co-operation," May, 1937, page 39.) When, in 1908, Mr. Wilson was promoted to treasurer he was succeeded as auditor by a former West End man, J. Henry Neal, who had earlier been chief clerk of several consolidated mechanical and electrical departments. Mr. Neal continued as general auditor until in 1917 he was made vice-president and general auditor, and after public control began he served for a year as president. He resigned Nov. 5, 1919, to become a banker. For the remainder of his life (i.e., until Apr. 5, 1935) he was president of the First Peoples' Trust Company.

** In 1907 Mr. Lindall was appointed superintendent of rolling-stock and shops, the power and rolling-stock responsibilities being divided. He continued as such until July 1, 1936, when he resigned to become advisory equipment engineer.

1901 promotion was from a surface-lines-division superintendency. He continued as head of the elevated division (later known as the rapid-transit lines) until May, 1933.* A surface-lines inspector, George Benjamin, was also transferred, in 1902, to the elevated division as trainmaster, in which position he remained for more than 18 years.

Still another surface-lines official to be transferred to the elevated division was Harry H. Hanson, who was made supervisor of the southern section. After nearly 12 years in this position he became assistant superintendent of transportation under Edward Dana, resigning to become president of the Middlesex & Boston Street Railway, which he still is.

When the "El" leased the West End the latter had an inspector named James Smith, who like Mr. Pasho had started his street railway career with the Cambridge Railroad. Mr. Smith had risen to be an inspector with the West End, and soon after the Railway was leased to the "El" he became chief inspector in an important surface-lines division, of which he later became superintendent.**

The Railway also employed an equipment man for the elevated division, Clark Doty, who had been employed by Frank J. Sprague in rapid-transit work.*** After serving as a shop foreman under Mr. Lindall, Mr. Doty later succeeded him as general foreman. Mr. Doty continued as general foreman of the elevated division until his death on Feb. 13, 1923.

Earlier in this "history" Julius E. Rugg was mentioned as West End superintendent.† He continued as superintendent of transportation of the Elevated, and the several divisions reported to him in all matters affecting transportation, until 1907, when he was succeeded by George R. Tripp, another West End man.

The Cambridge Railroad has been mentioned several times from the personnel standpoint, General Bancroft having been its superintendent. Associated with him then and later was Richard Hapgood, who had served as operating superintendent and later superintendent of tracks of the West End (of which General Bancroft was general roadmaster). He continued in this capacity, having charge of the surface tracks of the Elevated.‡

* Mr. Pasho, after retiring as R.T.L. superintendent, remained for a time in an advisory capacity with the Railway. He is hale and hearty today at the age of 78 years.

** On Sept. 1, 1919, Mr. Smith was appointed assistant to the then superintendent of transportation, Edward Dana, and just two months later succeeded Mr. Dana on the latter's promotion to be general manager. Mr. Smith continued in this position until he died on May 13, 1935.

*** Mr. Sprague's pioneer work in Boston was described earlier in this "history."

† See portrait, page 12.

‡ Mr. Hapgood continued with the Railway until he was pensioned Aug. 9, 1912. He died Nov. 17, 1923.



MANUFACTURERS' EXPERIMENTAL TRAIN TO DEMONSTRATE FEASIBILITY OF
MULTIPLE-UNIT CONTROL

From shortly after the beginning of operation of the elevated division a clerk and later chief clerk of the division was Dares D. Hall, who had occupied clerical positions with the West End since 1893, and had been a surface-lines division clerk with the Elevated. Mr. Hall continued as chief clerk throughout the period of private operation.*

As has been seen, the West End furnished many men of administrative talent to the Boston Elevated, but their experience had all been in street railway work. The elevated lines, however, were a new proposition. Due to the many structural and engineering problems that called for solution, a civil engineer possessed of the type of training and experience needed for this job had to be obtained. George A. Kimball, an engineer of wide experience, who had served as city engineer of Somerville and as a member of the Metropolitan Sewerage Commission, was selected as chief engineer of the elevated lines.† Under his direction the elevated structures were designed and erected.

The Railway also needed a man who had had experience in railroad work as distinguished from street railways. An able man of this type was found in an engineer then with the Union Elevated Railway of Chicago, Stewart S. Neff, who in 1900 came with the "El" as consulting engineer and in June, 1901, was appointed superintendent of the elevated division. He remained only a few

* In 1920 Mr. Hall was made assistant superintendent of rapid-transit lines, and when Mr. Pasho retired in 1933 succeeded him. When James Smith, superintendent of transportation, died in 1935, Mr. Hall was advanced to superintendent of transportation.

† Later, in view of the amount of subway construction with which the Railway was concerned, Mr. Kimball's title was changed to "Engineer of Elevated Lines and Subway Construction." He died Dec. 3, 1912, soon after the opening of the East Cambridge viaduct and the Cambridge subway, and when work on the Boylston street subway, the East Boston tunnel extension and the Dorchester tunnel was in the preliminary stages.

months in this position when he was succeeded, first, temporarily by Mr. Winsor, then by Mr. Pasho.*

“EL” CONSTRUCTION WORK PUSHED VIGOROUSLY†

PLANS for the elevated structure, as to architectural appearance and obstruction to light and air, were approved by the Mayor of Boston on Apr. 29, 1898. After several long public hearings the Railroad Commission approved the plans as to strength and safety of the structure, as to the convenience of the public, etc.

The design of the elevated structure comprised essentially the following elements: Steel columns supported on heavy concrete foundations, under which piles were used where necessary. Heavy cross girders mounted between the columns. Longitudinal girders of the lattice type installed between the cross girders to support the track and the trains which were to be operated over it.

Contracts for the structure were promptly let to steel companies and other contractors for the overhead structure, column foundations, stations and other construction.

* Mr. Neff, after leaving the Railway, was engaged in street railway and industrial work until, after a long illness he died on July 12, 1912, in Atlantic City, N. J., where he had been general superintendent of the Atlantic City & Shore Railroad.

† The construction of the elevated system was authoritatively described in a well-illustrated article, written by Geo. A. Kimball, chief engineer of the Railway, and published in the *New England Magazine* for July, 1901.



TWO TYPES OF ELEVATED LINE CARS

1, early type, partly wood construction; 2, all-steel type, which has superseded wooden cars

The route which the management selected for the elevated main line extended from Sullivan square, where a terminal was established, over Main street, Charlestown, over the new Charlestown bridge and Causeway street to the entrance of the Tremont street subway. The through tracks in this subway were used from the north incline to Pleasant street (now Broadway) where a new station (Pleasant Street Station) was constructed. At this point the earth incline over which the surface cars for South Boston and Roxbury reached the surface was removed, and a bridge was built at Pleasant street so that trains could pass underneath. From this point, beginning on land purchased for the purpose, an incline was built to, and on a curve over, the Boston & Albany and New Haven Railroad tracks, and over Castle street to Washington street. From there the route followed Washington street to the terminal at Dudley street.

This routing of the elevated line involved the discontinuance of all trolley-car operation through the subway from Pleasant street, and the provision of a surface loop through Pleasant street, Shawmut avenue and Tremont street. Trolley cars entering the subway from the north looped at Adams square or Brattle Station, and those from the south at Park street.

A second route of the elevated lines, "the Atlantic avenue loop," extended from Keany square, over Commercial street, Atlantic avenue, Beach street and Harrison avenue to a junction with the main line at Castle and Motte streets.



Boston Transit Commission

ELEVATED STRUCTURE UNDER ERECTION ON CHARLESTOWN BRIDGE
In background, swing span and erection derrick

ELEVATED LINES STATIONS

THE Roxbury terminal at Dudley street was located at the junction of several surface lines, reaching important suburban districts. The rapid-transit track passed through the center of the station, with a loading and unloading platform on each side. Surface cars reached the same level as that of the rapid-transit platforms by easy inclines, a loop track being provided on either side of the station so that transfers between surface cars and rapid-transit trains could be readily made. Through cars ran through the lower level of the station and the upper level was reached by an adequate number of stairways.

The Sullivan square terminal at Charlestown followed practically the same plan as Dudley street, with the difference, however, that there were five stub-end tracks provided for surface cars on either side of the rapid-transit tracks, with platforms between the stub-end tracks. These stub-end tracks required changing ends for all surface cars. Tracks were also provided on the lower level, but instead of operating directly through the station, as at Dudley street, the cars were looped around the waiting-room.

The design of the two terminal buildings differed considerably. At Sullivan square there was an arched roof of 180 feet clear span; whereas at Dudley street the roof was much lower.

The terminal stations, obviously, presented the greatest design difficulties, but the way stations were given equally scrupulous architectural and engineering care.

The cost of the above work within a period of three years, including rolling-stock, power plant and other equipment, was more than \$20,000,000.

“EL” DIVISION ROLLING-STOCK

THE first cars for the elevated division were naturally of the type used in New York and Chicago, with wooden bodies, open platforms and one wide door in the middle on each side in addition to the end doors familiar in steam railroad practice. The bodies were built up on steel underframes. Each car seated 48 passengers and was designed for a maximum load of 162. There were two 150-horsepower motors on one truck of each car, the other truck being a “trailer” truck, and multiple-unit control was used from the start. Of these cars 150 were ordered and operation began in June 10, 1901 (main line), with 3-car trains (lengthened to 4-car trains before the end of 1901). On the Atlantic avenue loop (opened Aug. 22, 1901) 2-car trains were used.

Rapid progress in elevated car design occurred during the elevated division's first decade. The original cars were remodeled, but the days of the wooden car in Boston were already numbered, in line with the progress being made in steam railroad coach construction. In 1906 the Railway ordered from a manufacturer of steam railroad rolling-stock 45 steel cars which embodied the latest developments in the steam railroad coach field.

These new cars were of the now familiar "easy access" type, a name which suggests convenience for boarding and alighting passengers. Architecturally the bodies were more pleasing and rugged in appearance than the old cars, having deep, pressed-steel side sills.

The motors under the steel cars were larger than those at first used, two of 200 horsepower each being mounted on one truck.

These cars set the standard for the elevated line cars. They eventually replaced all of the wooden cars. The illustrations on page 111 show one of the early wood-steel cars and an all-steel car of modern type.

POWER FOR THE "EL"

THE seven power plants which the Railway used for surface cars were not adequate for the prospective demands of the elevated lines. In his annual report for 1899 President Gaston mentioned the purchase in the preceding March of 2½ acres on Commercial street, occupied by stores, wharves and docks, and known as the Lincoln Wharf property. Here was being built a power plant of the most up-to-date design, with direct-connected engine-generator units of the largest capacity economical for this service. The three 4200-horsepower engines were of the cross-compound* vertical type, superseded today, but at the time representing advanced practice.**

At the Lincoln plant, the boilers, automatic stokers, feed-water heaters, coal-handling equipment, with other auxiliaries, were of the latest types.

The completion of this station brought the total generating capacity of the eight stations up to practically 37,000 kilowatts. This is less than the rated capacity of one steam turbo-generator which the Railway is operating today, a 40,000-kilowatt unit in the South Boston power plant.

* I.e., with the high and low pressure cylinders separate. A 2,700-kilowatt generator was located between the sections of each engine.

** These 2,700-kilowatt machines were in marked contrast to the tiny 62-kilowatt generators of the Allston station, the West End's first power plant, and the still smaller 50-kilowatt machines in Power Plant No. 1 at Central Power Station.

ADAPTING THE TREMONT STREET SUBWAY TO RAPID TRANSIT

As stipulated in the Act to promote rapid transit in the City of Boston* provision was made for the use of the subway for rapid-transit trains under specified conditions.

The conditions were that the West End, the lessee, should assign its rights or otherwise consent to permit the Boston Elevated trains to operate through the subway; that the Elevated should request the necessary changes and agree to consider the cost as part of the subway investment upon which rental was to be paid.

There were four tracks on the ground level between the northern end of the subway and Causeway street. Structural-steel inclines were built from the Causeway street elevated structure, connecting with the outside tracks of the subway. These tracks were adapted for use with trains, by providing long ties to support the 3rd-rail insulators, by adding the 3rd-rail and by providing guard rails on curves where necessary. At all stations which served both trolley cars and rapid-transit trains, the side of the platform used by the latter was raised to the approximate level of the floor of the rapid-transit cars. At many stations, due to track curvature, sliding platforms were necessary to close the wide space between the car door and the edge of the platform.

It was necessary in a number of places to cut into the side walls of the subway to provide clearance for the rapid-transit cars. Considerable difficulty was encountered on the southbound track in the so-called "sub-subway," where the outbound track leading to Pleasant street passed under the southbound track leading to the Public Garden incline.

The alterations in the Tremont street subway were made by the Boston Elevated.

When 3rd-rail trains were first operated in the subway all doors were opened by means of a key. There were attendants at each station who opened and closed all of the doors in a train.

THE EAST BOSTON TUNNEL

UNDER the Act of 1897, the Boston Transit Commission was instructed to construct a tunnel or tunnels for two railway tracks from Hanover street, or some other point suitable for connection with the subway authorized in 1894, and Maverick square

* Sect. 12, Acts of 1897, Chap. 500. When the Act of 1897 was passed the northern terminal of the subway had not been constructed. An underground station for surface cars had been contemplated as the North Union Station terminus of the outside subway tracks, while an incline was to be provided for surface lines from the north which were to terminate at Scollay square.



INCLINE FOR SURFACE CARS AT MAVERICK SQUARE

or near by, as soon as the Boston Elevated had been authorized to commence construction on its route first applied for.

This tunnel was to be rented to the Elevated Railway for 25 years at $\frac{3}{8}$ per cent of its gross receipts,* and a City toll of 1 cent per person passing through in either direction was specified. If the rental and tolls should exceed the interest and sinking fund requirements on the tunnel bonds, the toll was subject to reduction, or discontinuance.**

In accordance with the Act of 1897 the Commission constructed a tunnel for trolley cars between Maverick square, East Boston, and Court street, Boston, extending under Lewis street, the Harbor, State street and Court street, with way stations at Atlantic avenue and the Old State House. The Old State House Station was later re-named "Devonshire." The tunnel was opened for traffic on Dec. 30, 1904. It was the first sub-aqueous tunnel in America. The construction work was performed under pressure by the "shield method."

At the East Boston end of the tunnel the tracks connected with the surface tracks in Maverick square. At the Boston end a terminal, named "Court Station," was provided. This was close to Scollay Square Station of the Tremont street subway, but the only connection with that station was a foot passageway leading from the platform on either side of the Court street station to the northbound platform of Scollay Square Station. Exits and entrances also led to an "island" at the street level in Court street, and to the sidewalk in front of what is now the City Hall Annex.

* The lease embodying this rental and other items was executed Dec. 24, 1904. The term was 25 years from June 10, 1897, the date of approval of the Act of that year, covering this matter.

** On Feb. 7, 1916, Edward Dana, superintendent of traffic, paid to James Smith, superintendent, Div. 8, the last cent of toll paid in the tunnel. Tolls were abolished on this date.

At Atlantic Avenue Station four large elevators were provided to take passengers from the platform level in the tunnel to the street level, as well as to the level of State Street Station of the Atlantic avenue elevated line. A bridge was also installed from the head-house of Atlantic Avenue Station of the tunnel to the elevated-line station.

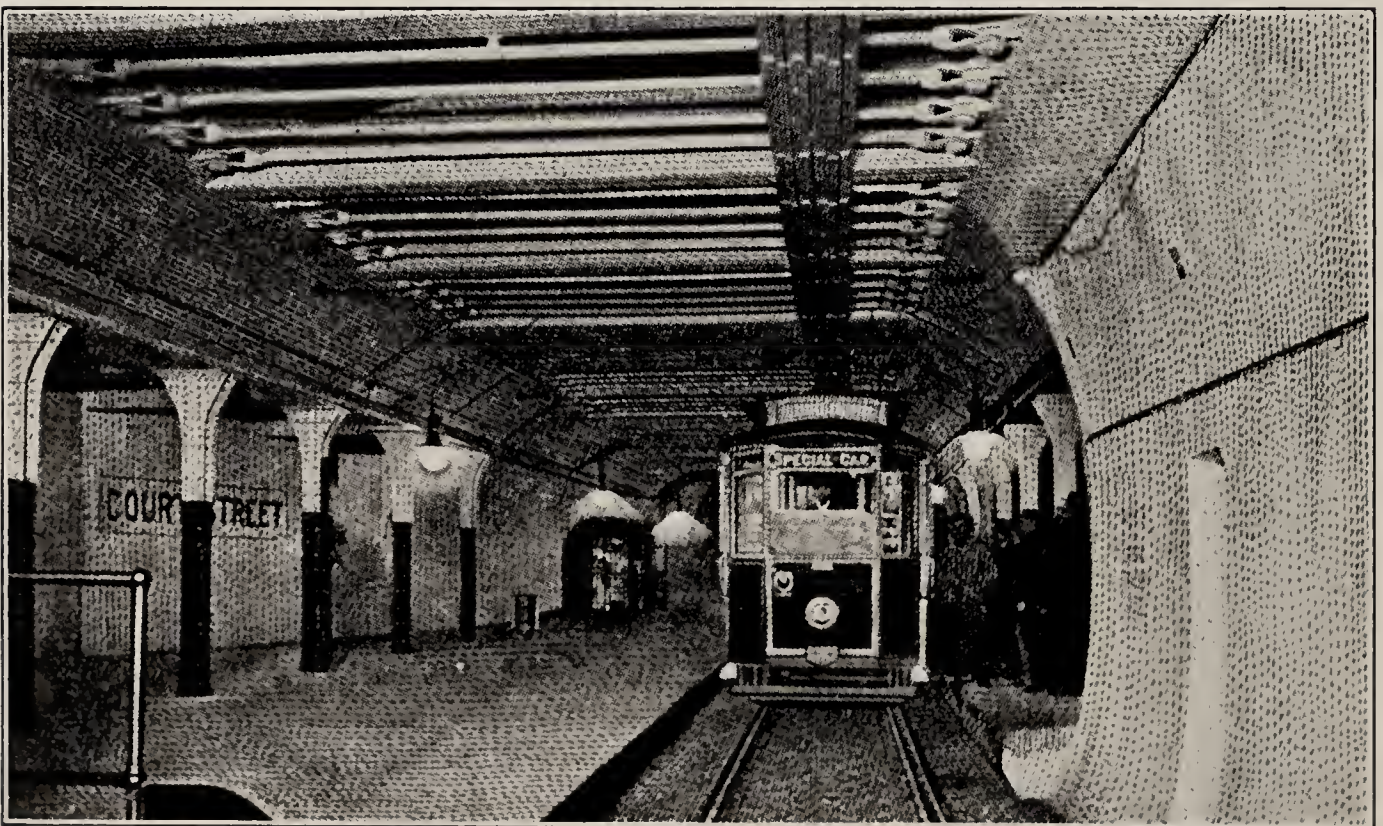
These elevators are unique in that they do not rise vertically as does the usual elevator. On account of the necessary narrowness of the station located in the middle of State street, the upper ends of the elevator wells had to be built closer together at the top than at the bottom. This was accomplished by curving the wells inward from the bottom to the top.*

THE WASHINGTON STREET TUNNEL

A GLANCE at the map of the elevated line routes as they were in 1901 will convince any one that only a subway or tunnel under Washington street would provide real rapid transit through the business section of Boston.

The use of the Tremont street surface lines subway, expensive and inconvenient as it was, permitted the elevated lines to function promptly, but this at best was a temporary expedient. Agitation for a new tunnel or subway began before the elevated lines were

* In accordance with an act passed by the Legislature in 1911, the East Boston tunnel was extended easterly to Bowdoin square, the extension being opened on March 18, 1916. This extension involved lowering the tunnel to pass under the Tremont street subway, a new station, "Scollay Under," below Scollay Square Station, and the abandonment of Court Street Station.



From postcard printed in Germany

COURT STREET STATION, ORIGINAL WESTERN TERMINAL OF EAST BOSTON TUNNEL

completed. The outcome was an Act passed in 1902,* approved June 27, 1902, and accepted by the Boston voters Dec. 9, 1902.

The Act authorized the Transit Commission to construct a system of tunnels (for elevated cars) and subways (for surface cars) so designed as to be adapted for the accommodation of two tracks especially for elevated cars and two tracks especially for surface cars, between points within a specified area. The tunnel was to be constructed as soon as the voters had approved the Act; the subway at a later period unless those concerned should decide to build all or part of the subway with the tunnel.† A rental of 4½ per cent of the net cost was specified in the law.

The route selected for the tunnel, as approved by the Railroad Commission on Nov. 29, 1903, extended from the north incline at Causeway street, thence largely under Washington street and connecting with the elevated structure on Washington street at Castle street by means of an incline over private land and over the Boston & Albany and New Haven tracks.

Extremely difficult conditions were encountered in the construction due to the narrowness of Washington street and the height of the abutting buildings, particularly the Ames building. Because the street is so crooked, as well as narrow, it was not always possible to build the tracks at the same level. Thus at Milk Street Station, which serves southbound traffic, the northbound track was built under the station platform. At Haymarket square two stations, known as "Union-Friend," were provided, with connections from both to Haymarket Square Station of the Tremont street subway. Another station, for northbound traffic, was built under the Old State House, with exits and entrances in the basement. Stations were also built at Winter and Summer streets and at Essex and Boylston streets.

The Washington street tunnel was open for service on Nov. 30, 1908, and the tracks in the Tremont street subway were again used for trolley cars.** After this it was no longer possible to loop trains from the north *via* Atlantic avenue.

* Stat. 1902, Chap. 534.

† Authority to construct the subway was later revoked. Stat. 1907, Chap. 573, Sect. 17.

** The work of connecting the tracks in the Washington street tunnel with the north incline; connecting the tracks on the south incline with the elevated structure at Castle street; removing all of the wooden platforms and other station appurtenances from all of the stations in the Tremont street subway; removing the 3rd-rail and altering the tracks to be used again with trolley cars; demolishing Pleasant Street Station; filling in the incline and reconstructing the trolley tracks on the incline to connect with the tracks on Tremont street and Shawmut avenue as they existed before rapid-transit trains were operated in the Tremont street subway, was all completed over a week-end. All of this work was done by the Boston Elevated Railway with the exception of certain construction work a short distance north of Union-Friend Station where the tracks of the Washington street tunnel extended through the wall of the Tremont street subway, which was done by the Transit Commission. At this point it was necessary to take out a considerable number of existing columns supporting the roof of the Tremont street subway temporarily, and the roof of the Washington street tunnel, and to replace them with columns in suitable positions to support the roof as it now exists.

After several experiments to determine the best method of serving the stations on Atlantic avenue, a short stub-end track was provided between the two main-line tracks just north of North Station.

By the use of a suitable platform which was installed at this point, passengers on Atlantic avenue trains could transfer to northbound and southbound trains at North Station. This temporary arrangement was later removed, after an interchange arrangement for the Atlantic avenue trains had been provided, in November, 1911, as part of the construction of the East Cambridge viaduct. This was called "North Station West," and here passengers from Atlantic avenue trains were able to transfer to the viaduct trolley cars in either direction, as well as to the main-line trains at North Station in either direction.

ELEVATED LINE EXTENDED TO FOREST HILLS SQUARE

THE next logical step in the development of the rapid-transit lines was an extension of the elevated structure south from Dudley street *via* Washington street to Forest Hills square. The extension, with one intermediate station at Egleston square where connection could be made with surface cars on Columbus avenue, was opened for service on Nov. 22, 1909. The design of the elevated structure for this extension differed from the structures previously built in that plate girders instead of lattice girders were used to support the track and trains.

At Dudley Street Terminal a new platform was constructed on Washington street in connection with the extension, by which passengers might board or leave the trains. The platform was connected by passageways and stairways with both levels of the terminal.

For the new terminal at Forest Hills a well-designed structure was provided in the square, about opposite the New Haven Railroad station. As a system of parkways crosses Washington street at this point, the elevated structure over the parkways was so designed as to fit in with the surroundings and harmonize with the New Haven bridge carrying the New Haven tracks over the same parkways.

The elevated structure at this point was built on massive reinforced concrete piers, supporting a concrete floor with side balustrades. The floor was made watertight, and the balustrades were carried high enough to minimize the noise of trains operating over the structure.

Not long after the extension was started, as a result of a peti-

tion to the Railroad Commission, a station was built at Green street. It was put into service on Sept. 11, 1912. Changes were later made, also, at Egleston square. Upon a tract of land at Columbus avenue and Washington street, a station was built to facilitate interchange of passengers between the elevated trains and surface cars, and a double-file escalator was built in the elevated station. This improvement was put into service on Jan. 20, 1917.

A RADICAL CHANGE IN POWER SUPPLY

AFTER the elevated lines were built, the Railway had eight power stations, large and small, each originally located as near as possible to the center of the lines which it primarily served. Practically all of the stations were tied together (in parallel, electrically speaking), so that they could help each other out. The operation must have been efficient, for a long editorial in the *Street Railway Journal* in 1904 was devoted to a study of the remarkably low power costs of the Boston Elevated. However, a new form of power distribution, by alternating current at a high voltage, was arousing interest throughout the country, and, always forward-looking, the "El" management adopted it as soon as practicable. The plan was to have one large, main central plant from which power could be transmitted all over the system, to be transformed to trolley-voltage direct current in substations.

A site in South Boston was selected for the station, where land was relatively cheap and which, being on tidewater, provided



EARLY PREPAYMENT-TYPE SURFACE CAR
In background, one end of cross-bench open car, formerly popular for summer riding

an ample condensing water supply and excellent facilities for getting coal.

The contract for the work was let in November, 1910, and on Jan. 12, 1911, ground was broken for the South Boston power station. On Nov. 14, 1911, 307 days after ground was broken, the station with machinery complete for 30,000 kilowatts was put into commission.

This station was the "last word" in advanced design of 25 years ago. Its "prime movers" were 15,000-kilowatt vertical steam turbine-generators, a type of unit which was replacing reciprocating engines in power-plant practice. There were installed initially 16 water-tube type boilers of 600 horsepower capacity.*

From the power plant, power was (and still is) distributed in underground conduits at the voltage of the generators, 13,200 volts, three-phase.** It was delivered to machines which changed the power to trolley-voltage direct current in rotating machines, known as rotary converters. From that point on the distribution was just as it had been before from the power stations. The rotary converters were located in substations well distributed over the system.

The South Boston power station was enlarged from time to time until today it has an installed capacity of 120,000 kilowatts. The Lincoln Wharf station, built as a part of the elevated-line development, has recently been entirely re-equipped for alternating current. The other power stations have been abandoned in so far as power generation is concerned.

THE CAMBRIDGE MAIN STREET SUBWAY AND BEACON HILL TUNNEL

THE City of Cambridge figured in the early plans for local rapid transit,† but nothing came to them until after the passage of legislation in 1906, authorizing "the Boston Elevated Railway Company to construct a subway or subways in the City of Cambridge and to provide for the connection thereof with the railway system in the City of Boston."

As this project developed it was decided that the subway in Cambridge would be constructed by the Railway, although the subways in Boston had been built by the municipality and leased to the Railway. It was also decided to operate rapid-transit trains over West Boston (Longfellow) Bridge, in the design of which

* A "boiler horsepower" is a nominal rating based on heating surface, 10 square feet per horsepower. A boiler horsepower would produce several actual horsepower at the turbine.

** That is, the power goes out on a 3-wire circuit.

† See page 40.

the center section was reserved for surface cars or trains, and of which the Railway paid part of the cost of construction.

These plans were carried out, and the Railway also built an elevated structure from the Boston end of the bridge to the proximity of Lindall place, where the tracks entered a new tunnel (the Beacon Hill tunnel) constructed for the City of Boston by the Boston Transit Commission. The Commission also built a station below Park Street Station of the Tremont street subway, "Park Street Under."

The Cambridge subway passed under Main street and Massachusetts avenue in that city. Stations were provided at Kendall, Central and Harvard squares. The terminal at Harvard square was designed especially for interchange of passengers with surface cars.

Due to the restricted space at Harvard square, the rapid-transit tracks were built at different levels so that the loading platform for the trains for Boston is located under the track for trains from Boston. A similar arrangement was used for the surface tracks, the unloading platform for cars from Arlington being located under the track for cars bound for Arlington.

From Harvard Square Station the rapid-transit tracks were extended under Brattle street to property lying between the Bennett street surface-lines carhouse and Boylston street, one block long. Here were constructed an inspection and repair shop, storage tracks, a loop track and Stadium Station, designed to facilitate handling of the crowds attending football games at the Harvard Stadium.

The Beacon Hill tunnel was built with a circular bore, a type of construction best adapted to resist the pressure of the hill above it. At one point in this tunnel there is a 86-foot depth of fill above the top of the rail. This type of tunnel required a large amount of ballast to provide the road-bed.

At Park Street Under Station an interlocking tower was installed, with tail tracks extending east of the station, and with a "scissors" crossover between the main tracks. This arrangement permitted rapid changing of ends and resumption of service in the reverse direction.

Alterations were later made in Park Street Station of the Tremont street subway to increase the platform area. The southbound platform was increased from 7,000 to 17,000 square feet, and the northbound platform from 6,000 to 13,000 square feet. This work was completed on Mar. 8, 1915.

The cars used in the Cambridge subway are much larger than



SURFACE-CAR EVOLUTION ON THE ELEVATED

1, early single truck box car, without vestibules; 2, double truck box car with vestibules and entrance doors; 3, articulated unit, constructed from two single truck box cars, with central compartment between; 4, semi-convertible car with center-entrance trailer; 5, center-entrance motor car.

those used on the original rapid-transit lines. Before a decision as to the dimensions of the cars was reached, skeleton-frame cars were built and tested over curves of varying radius. The result was the selection of 69 feet 2½ inches for the length and 9 feet 6 inches for the width.

The cars were equipped with three doors on either side, spaced to provide for quick loading and unloading.

One truck under each car carries two 200-horsepower motors, or *1,600 horsepower per 4-car train*. The second truck on each car is a "trailer" truck.

The completed Cambridge subway and connection was opened to the public on Mar. 23, 1912. This "marked the beginning of a new transportation era for the suburban cities and towns lying at the west of the New England capital."*

It brought the total investment in subways, tunnels, elevated structures and related construction close to \$100,000,000.

To impress the public with the magnitude of this subway and connection, with equipment, the Company stated in an advertisement that the Cambridge subway had cost about one-ninth of the entire taxable valuable of Cambridge, which then had a population of 105,000.

* *Electric Railway Journal*, May 11, 1912, page 782.



Boston Transit Commission

VIEW ON WASHINGTON STREET, AS PLANKED OVER DURING CONSTRUCTION OF
WASHINGTON STREET TUNNEL

The cars in the picture are of the open cross-bench type

From the public standpoint it provided a safe and comfortable ride, with a time saving of 17 minutes out of the 25 minutes formerly required between the terminal points.

THE EAST CAMBRIDGE VIADUCT

IN 1906 an Act was passed by the Legislature providing for the building by the Boston Elevated of an elevated railway between a point easterly of Lechmere square in Cambridge to connect with the subways and Washington street tunnel in Boston.*

In accordance with this act the East Cambridge viaduct was constructed from the northerly end of the Tremont street subway to Lechmere square, Cambridge. Its route was over Causeway and Lowell streets, over some private right-of-way, across the Charles river and over Bridge street. At the square, connection was made with the surface tracks on Bridge and Cambridge streets.

At the Boston end of the viaduct, track connection was made with the two outside tracks in the Tremont street subway, the viaduct level being reached by an easy incline. A station was built in front of the North Station as it then existed, and a bridge was built to facilitate access to the railroad station concourse.

In design the viaduct differed from the original elevated structure in that the deck was built of reinforced concrete, with tracks laid on ballast to reduce noise. On either side of the structure reinforced concrete balustrades were built to improve appearance, reduce noise and provide additional protection in case of derailment.

Over the Charles River, and parallel to the Charles River Dam on the downstream side, the design was changed to provide a reinforced steel and concrete arched viaduct, of pleasing appearance, corresponding in this respect with the Longfellow Bridge farther up-stream. Over the channel was installed a 2-leaf, bascule-type drawbridge.

The East Cambridge viaduct, 1.2 miles long, was put into service on June 1, 1912, resulting in a time saving to patrons of 7 minutes in either direction.

THE BOYLSTON STREET SUBWAY

ALTHOUGH an Act passed in 1907 provided for a subway in the Charles River Embankment** this route was later abandoned in favor of the Boylston street subway, which was constructed in accordance with an Act passed in 1911. The route of this subway

* Stat. of 1906, Chap. 520, Sects. 21, 22. Stat. of 1894, Chap. 548, the "Meigs franchise." provided for an elevated railway over Craigie bridge or a new bridge over the Charles river.

** This was to be known as the Riverbank Subway, and considerable work was done in connection with the plan. In fact, the City put out some bonds designated on their face "Boston Riverbank Subway Loan."

was under Boylston street to a point near Massachusetts avenue, where it crossed private property and passed under public streets, coming to the surface in Commonwealth avenue just east of Kenmore street. Here connection was made with the surface tracks on Beacon street and Commonwealth avenue.

The permanent intown terminus of the Boylston street subway was never definitely decided upon. Post Office square was favorably considered. Passengers on the several routes now served by the subway were asked to vote as to the location of the terminus or connection with an existing rapid-transit line. The cross-section of the Boylston street subway was made large enough to accommodate cars of the size later operated in the Cambridge subway, and consideration had been given to the possibility of later raising the station platforms to the level of the car floor of such large cars.

The curves in the subway were designed with long radii, the alignment being such that trains as well as trolley cars could be operated at a speed of 40 miles per hour or more. At the point where the subway passes under Muddy River the steepest grades and the greatest curvature occur.

Finally a decision was reached that a temporary connection be made with the Tremont street subway at its Boylston street station, and legislative permission for this connection was obtained. At the same time permission was obtained to transfer the Public Garden incline to Boylston street and to widen Boylston street accordingly. These changes were made and the old incline was filled in.

Underground stations were provided at Copley square and Massachusetts avenue on the Boylston street subway, and an enclosed prepayment area with platforms was constructed at the southern end of the Mall in Commonwealth avenue.

In the construction of this subway the cut-and-cover plan was used, so that traffic, including surface cars, might continue to operate on the street.† The high tower on the new Old South Church at Dartmouth street caused a great deal of anxiety, and the Transit Commission decided that it could not be responsible for results if trolley cars continued to operate over Boylston street during the construction of the subway. The Railway was requested and agreed to build temporary double tracks on Exeter street from Boylston street to Huntington avenue; to use the Huntington avenue tracks to Copley square, and to build temporary tracks on St. James

† During the excavation of the subway, which is on filled ground, objects of great antiquity and interest were dug up. A description of many of these appears in detail in the reports of the Transit Commission. Many are preserved in the museum of the Bostonian Society in the Old State House.

avenue and Arlington street, connecting with the tracks on Boylston street. This work was accomplished in 18 days.

After the Boylston street subway had been completed the temporary tracks were removed, Boylston street was resurfaced and new tracks were laid on the street level. Platforms were also built in Boylston street near Arlington street to provide safe places for passengers to board and alight from cars which here came to the surface.

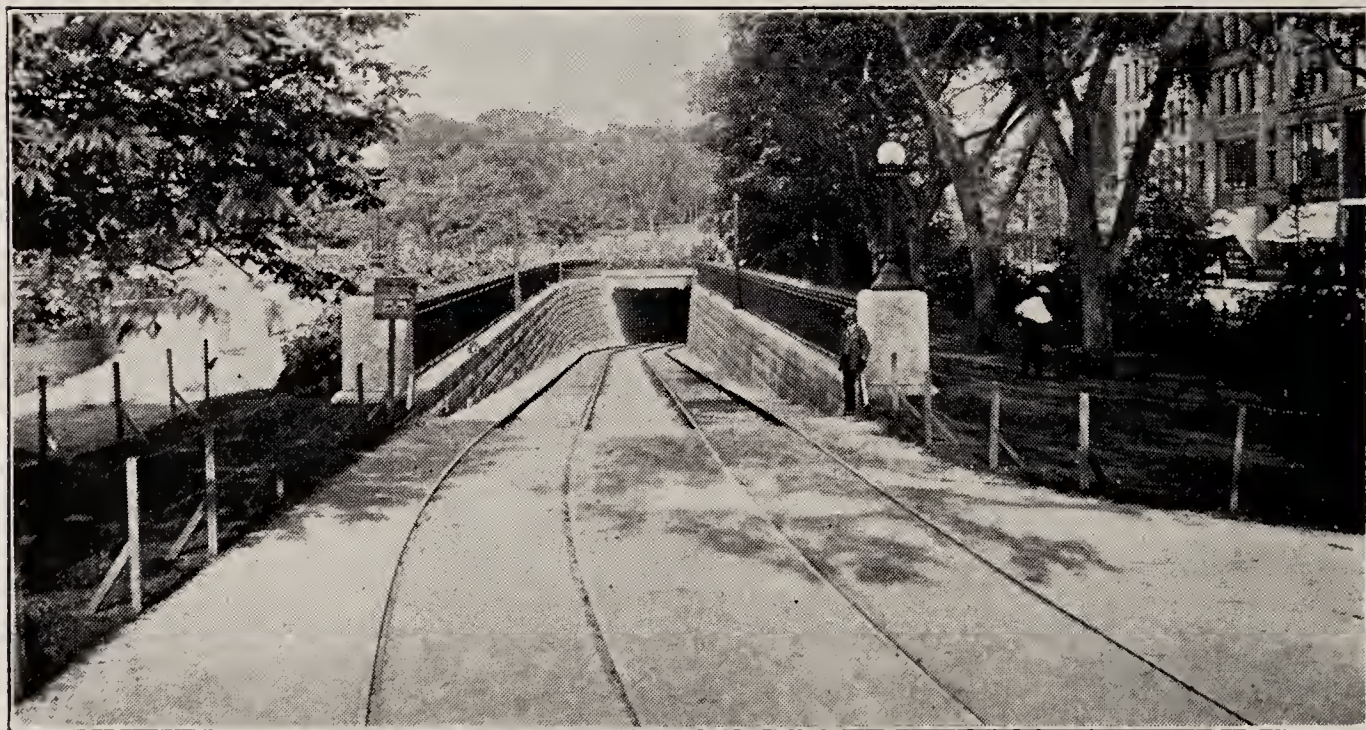
The Boylston street subway was completed and opened for use on Oct. 3, 1914.

THE DORCHESTER TUNNEL

THE year 1911 was a notable one in local traction history, for in that year a comprehensive bill became a law,* not only providing for the Boylston street surface car subway, already mentioned, but also for an extension of the East Boston tunnel (for surface cars) and, most ambitious of the three, for the Dorchester tunnel. All of these were public-fund projects.

At this time the East Cambridge viaduct, a company enterprise, was under construction; the elevated extension (also company built) had recently been completed, and the Cambridge subway (company built) and the Beacon Hill tunnel (publicly built) were rapidly approaching completion. It is quite evident that both company and public were traction minded.

* Stat. 1911, Chap. 741.



ORIGINAL INCLINE FROM TREMONT STREET SUBWAY TO SURFACE IN PUBLIC GARDEN

This incline was abandoned and filled in when the Boylston Street subway was built. A short spur track forming part of the track on the original incline still remains at the foot of the present Boylston Street incline.

OPENING DATES—SUBWAY AND ELEVATED LINES 1897 TO 1918 (First Half)

| | | DATE OPENED | |
|--------------------------------|-----------------------------------|-------------|----------|
| Tremont St. Subway..... | Church St. to Park St..... | Sept. | 1, 1897 |
| | Pleasant St. to Park St..... | Sept. | 30, 1897 |
| | Park St. to North Station..... | Sept. | 3, 1898 |
| Elevated Lines..... | Sullivan Sq. to Dudley St. | | |
| | via Tremont St. Subway..... | June | 10, 1901 |
| | Atlantic Avenue Loop..... | Aug. | 22, 1901 |
| | Thompson Square Extension.... | May | 22, 1902 |
| | Forest Hills Extension..... | Nov. | 22, 1909 |
| | Green St. Station..... | Sept. | 11, 1912 |
| | Egleston Sq. Sta.—street level | Jan. | 20, 1917 |
| East Boston Tunnel..... | Court St. to Maverick Sq. Incline | Dec. | 30, 1904 |
| East Boston Tunnel Extension.. | Cambridge St. Incline to | | |
| | Court St..... | Mar. | 18, 1916 |
| Washington St. Tunnel..... | | Nov. | 30, 1908 |
| North Station..... | Temporary shuttle station..... | Nov. | 30, 1908 |
| North Station West..... | Permanent shuttle station..... | Nov. | 13, 1911 |
| Boylston St. Subway..... | | Oct. | 3, 1914 |
| East Cambridge Viaduct..... | | June | 1, 1912 |
| Cambridge Subway and | | | |
| Beacon Hill Tunnel..... | | March | 23, 1912 |
| Dorchester Tunnel..... | Park St. to Washington Sta. | April | 4, 1915 |
| | Washington to South Sta..... | Dec. | 3, 1916 |
| | South Sta. to Broadway..... | Dec. | 15, 1917 |
| | Broadway to Andrew..... | June | 29, 1918 |

The Dorchester tunnel was an extension of the east and west tunnel from Harvard square to Park street. It was built in sections. The first section was from Park street to Washington street, where a station provided passenger interchange with the Winter and Summer stations of the Washington street tunnel. This was opened on Apr. 4, 1915. The second section extended to South Station, providing interchange at that point with the Atlantic avenue elevated line, as well as with the steam railroads. This was opened on Dec. 3, 1916. The third section extended to Broadway, in South Boston, where connection could be made with all surface-car lines operating in the South Boston district and with lines connecting Boston proper and this district. This was opened on Dec. 15, 1917. Following this the tunnel was extended to Andrew square, where a terminal station was provided, and where connection was made with surface-car lines on Dorchester avenue and on Boston, Hampton and Dorchester streets. This station was opened on June 29, 1918.

The route of the Dorchester tunnel was from Park street station, across under Tremont street, under Winter and Summer streets, by the South Terminal, across under Fort Point Channel, swinging under Dorchester avenue near Broadway and continuing under Dorchester avenue to Andrew square.

At all of these temporary terminals the same provision was made for turning back trains as had been made at Park street, namely, an interlocking tower and tail tracks with "scissors" crossover. Broadway Station was constructed on two levels, the one

immediately below the street surface being used by trolley cars and the lower level by the rapid-transit trains. Escalators were installed between the two levels.

M. C. BRUSH ELECTED PRESIDENT

ON Sept. 15, 1916, after serving as president for nearly seventeen years and at the age of 61 years, General Bancroft resigned as president and was immediately elected chairman of the directors. He remained a director until after the property was taken over by five public trustees specified in the Public Control Act.*

His place as president was taken by Matthew C. Brush, vice-president, who had been with the Railway since 1910. He had served first as assistant to the vice-president, later as second vice-president.

Mr. Brush had graduated from the Armour Institute of Technology and the Massachusetts Institute of Technology. He had had experience both as a manual worker and as an executive in the transportation field. With the Elevated he had shown marked aptitude in public relations, as well as in transportation. He had ample opportunity to use this aptitude in the negotiations leading up to the Public Control Act.

In commenting upon the resignation of General Bancroft and the election of Mr. Brush the *Street Railway Journal* of Sept. 23, 1916, stated:

* General Bancroft retired from active business life after relinquishing his duties with the "El." He died on Mar. 11, 1922, at the age of 67 years.



HEAD-HOUSE OF ADAMS SQUARE STATION, TREMONT STREET SUBWAY
This head-house was replaced in 1931 to facilitate the movement of street traffic.

Both men have had distinguished careers in the transportation industry. Mr. Brush becomes executive head of the Company at the age of thirty-nine, and is one of the most widely-known operating officers in the country. General Bancroft's name has been synonymous with the development of the Boston system from that of horse-car days to its present magnitude, and his able administration of the property has earned widespread commendation.

Mr. Brush takes office at a time when the burdens laid upon the Company by the public and by increased costs of operation have become so heavy as to necessitate an inquiry into its financial problems by a special legislative committee, and he has been closely associated with the preparation of the Company's case from the standpoint of securing additional net revenue, for presentation at forthcoming hearings.

Mr. Brush served as president until several months after the trustees assumed control, and was reappointed president by them, resigning Oct. 15, 1918.

SOME PERSONNEL CHANGES DURING THE PERIOD OF PRIVATE OPERATION

EARLY in this section the names of several men were mentioned, most of them being inherited, so to speak, from the West End.

During the period 1897 to 1918 there were numerous changes in personnel and in their duties and responsibilities. With the passing of time, the Railway had to supplement the administrative staff with younger men. One of the first to be employed in this period was Charles B. Gleason, who came July 1, 1898, as assistant in a department in charge of all legal matters growing out of the construction of the elevated railway. In July, 1916, he became head of that department and, after completion of its work in 1920, he became assistant in the general counsel's office. Since 1920 also, he has been clerk of the corporation.

Another addition to the staff in 1898 was Daniel L. Prendergast, who was appointed real-estate agent. He came from Lowell,



ALL-STEEL CAR OF CAMBRIDGE SUBWAY

The great length of this car is possible because curves on the Cambridge subway are few and of long radius

where he had been transfer and corporation clerk of the Appleton Company.* Mr. Prendergast was a cousin of J. M. Prendergast, mentioned earlier as one of the first directors of the Elevated.

In 1899 an "El" recruit was Thomas F. Sullivan, who after serving an apprenticeship in clerical positions, ultimately became assistant superintendent of tracks, and finally roadmaster. He left the Railway to become Commissioner of Public Works and since Apr. 1, 1922, has been chairman of the Boston Transit Department.† As such he has charge of all the City's subway and other construction connected with transportation.

Vice-president Sergeant in 1900 engaged as clerk in his office a recent commercial college graduate, Ernest M. Flint. Mr. Flint later served as chief clerk in the bureau of maintenance, chief clerk in the office of the president (Mr. Brush) and, as at present, assistant to Mr. Dana, first when the latter was general manager and later when he became president and general manager.

Early in 1901 the need for a purchasing agent with experience in heavy railroad work became apparent and a well-equipped man was found in Edward Mahler, whose varied experience had been exactly in line with the "El" requirements. He served the Railway in the capacity of purchasing agent for 33 years.‡ On Mr. Mahler's staff practically from the beginning of his term as purchasing agent, and beginning as an office boy, was J. Garfield Stone. Mr. Stone rose through clerical positions to be assistant purchasing agent (1917) and on Mr. Mahler's death succeeded him.

Hon. Russell A. Sears joined the legal staff of the Railway in 1902 as general attorney in charge of claims. He had been in active private legal practice before this.** He was a leader in the field of accident prevention.*** Associated with Mr. Sears, and joining the legal staff on the same day, was Maurice P. Spillane, who was first claims attorney and, eleven years afterward, assistant general attorney. Mr. Spillane succeeded Mr. Sears when the latter died in 1932.

After a few years, the management of the "El" realized that the operation of the elevated division had more in common with

* Mr. Prendergast remained real-estate agent of the Railway until his death in 1920.

† The Boston Transit Department succeeded the Boston Transit Commission, the last report of which covered the year ended June 30, 1918. Colonel Sullivan, who served in the Spanish-American War and who earned his military title during the World War when he was in command of the 10th Regiment, Massachusetts State Guard, was the first chairman of the Transit Department under a new set-up prescribed by the City Council early in 1922. The ordinance provided for three commissioners. The others appointed in 1922 were Francis E. Slattery and Louis K. Rourke.

‡ He died after a short illness on May 17, 1934, while still "in the harness."

** Mr. Sears had been associated with Samuel L. Powers, who many years later was chairman of the board of public trustees of the "El."

*** Mr. Sears served the Railway continuously from Oct. 20, 1902, until his death on July 22, 1932.

steam railroads than with street railways. The tracks imposed the greatest problems due to the sharp curves, particularly in the subway but on the overhead structure as well. A Boston & Maine man with the requisite experience to enable him to cope with these problems, was found in Harry M. Steward, who was engaged as roadmaster of the elevated division in 1903. With him came a number of other railroad engineers. Mr. Steward's work in the elevated division led to his appointment as chief engineer of maintenance of way in 1912 and to his present position of superintendent of maintenance in 1917.

Earlier in this "history" mention was made of the radical change in the power system from direct to alternating current. The first chief engineer of the great South Boston power station, appointed in 1911, was Frederick S. Freeman, who in the four years since he had joined the "El" as a mechanic had risen rapidly and had been made chief engineer of the Dorchester direct current power station. In 1912 he was appointed superintendent of power and ever since has been responsible for both generation and distribution of power.

In 1907 a recent Harvard graduate, Edward Dana, became affiliated with the Elevated. He was employed in different departments, and the operating problems of the business particularly appealed to him. General Bancroft set him to studying transportation conditions and before the period of private control ended he had risen to be manager of transportation.*

Two years after Mr. Dana joined the Railway, another young man, John H. Moran, secured employment in a beginner's capacity with the mechanical department. His interests, however, were along legal and accounting lines. In his early years with the Company he completed a course in the Harvard School of Business Administration, following this with a course in the Northeastern Law School. He was admitted to the bar in 1916, later securing a master's degree in law from Boston University.**

When Mr. Moran became vice-president and comptroller in 1936 his place as general auditor was taken by the assistant auditor, Michael H. Cullen, who was an early recruit to the Elevated staff. He, in fact, became clerk in the auditing department in 1898, and thereafter rose successively from one administrative job to another in the department. He was made assistant general auditor in 1925.

* During the period of trustee control Mr. Dana has been successively superintendent of transportation, general manager, vice-president and general manager, and finally, president and general manager.

** Early in the period of trustee control Mr. Moran was made general auditor, which he remained until on Mar. 23, 1936, he was promoted to be vice-president and comptroller. On the retirement of H. L. Wilson as treasurer he became vice-president and treasurer.



J. HENRY NEAL
1918-1919

Presidents of the Boston Elevated Railway
Under Trustee Control

Although there was no president from Nov. 30, 1919, to Jan. 1, 1937, Mr. Dana has been chief executive officer since the former date. M. C. Brush's presidency carried over a few months into the trustee period. His portrait appeared on page 102 of the December, 1937, issue.



EDWARD DANA
1937 to date

Bachrach

The Boston Elevated Railway Under Public Control From 1918

SINCE July 1, 1918, the Boston Elevated Railway has been operated for the Commonwealth as lessee by five public trustees appointed by the Governor. The conditions covering this lease constitute the so-called Public Control Act, passed May 22, 1918,* and amended May 19, 1931.** The road was to be operated on a service-at-cost basis, and the Commonwealth guaranteed to pay a specified return on the common and preferred stocks, deficits from operation, if any, to be assessed upon the cities and towns served, with repayments from surpluses when available.

The financial dilemma of the Railway, restricted by its franchise to a 5-cent fare with free transfers, was the occasion for this drastic corrective legislation. The legislators realized that good transportation was essential to community prosperity, and that good transportation could not be furnished at a 5-cent fare. In addition to restrictions on revenue, the Railway had been forced to carry increasing rentals on additional subways and tunnels, as well as other fixed charges. Difficulties thus already serious enough were increased by conditions resulting from the participation of the United States in the World War, at its height at the time the Public Control Act was passed.

The principal reason why the unusual procedure of leasing a public utility was followed by the State was succinctly stated in an advisory opinion of the Supreme Judicial Court of Massachusetts, rendered to the Senate in 1919, a brief excerpt from which follows: "The chief design of that act (i.e., the Public Control Act) was to provide by public operation for fares at rates sufficient to meet all costs of furnishing the service."

WHAT IS THE PUBLIC CONTROL ACT?

THE essentials of the Act of 1918 have been summarized in connection with several legal proceedings. How they appeared to the United States Supreme Court is indicated by the following

* Approved by the stockholders, June 3, 1918.

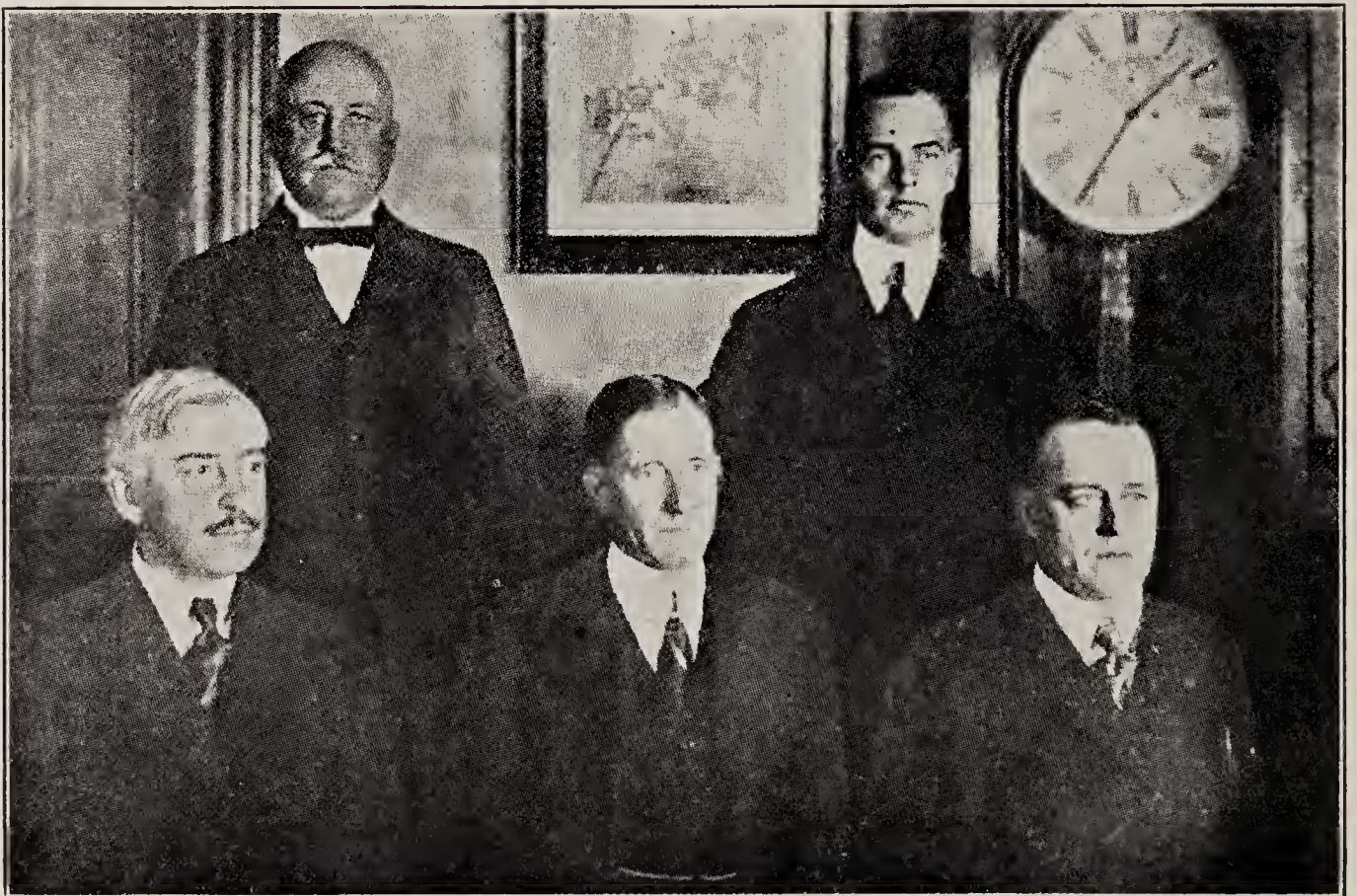
** Approved by the stockholders, June 30, 1931.

excerpts from a decision of the Court in an opinion by the late Mr. Chief Justice William H. Taft*:

The Railway Company got into financial difficulty. It served the residents of Boston and other towns of the Commonwealth. The General Court in the public interest passed the special act of 1918 to relieve the situation. In general the act provided for the appointment of trustees who were to take the railway out of the hands of the company and operate it under the leases to the company by the City of Boston, on condition that the stockholders of the railway company accepted the provisions of the act. It is not necessary to set out what these provisions in detail are, except to say that they provide for the payment of dividends on the stock of the company, the repair and maintenance of the railway, the raising of \$3,000,000 by the company for the improvement of the property and a reserve fund, and the payment of any deficit in operation out of the treasury of the Commonwealth. If the Commonwealth is called upon to make payments, to meet deficits or diminution of the reserve fund, such amounts are to be assessed upon the several cities and towns in which the railway operates, as an addition to the regular state tax, in proportion to the number of persons in said cities and towns using the service of the company at the time of the payments as determined by the trustees. The trustees are to fix the fares to meet the cost of service, including taxes, rentals and interest on the indebtedness of the company, fixed dividends on the preferred stock, and five per cent on the common stock for two years, five and one-half per cent for the next two years and six per cent for the remainder of public operation, which is for a period of ten years and thereafter as the Commonwealth shall determine.

What the Commonwealth did was to help the people of the towns which the railway served when the railway's finances threatened its collapse, by taking over the lease of the railway company for a valuable consideration."

* In an opinion affirming a decree of the Supreme Judicial Court of Massachusetts, which sustained the right of the state treasurer to collect from the City of Boston (the plaintiff) its share of the first "EI" deficit. Delivered at the October term, 1922.



THE FIRST BOARD OF TRUSTEES

Seated, left to right: William M. Butler; Louis A. Frothingham, chairman; John F. Stevens. Standing, left to right: Galen L. Stone, Stanley R. Miller.

THE EARLY TRUSTEES

ON July 1, 1918, five trustees, selected by Governor McCall, took possession of the Boston Elevated Railway property and assumed its management. They included: William M. Butler, lawyer and public utility official; Louis A. Frothingham (elected chairman), lawyer, bank president, and former Lieutenant-Governor; Stanley R. Miller (elected secretary), lawyer, former law partner of Governor McCall, and later his private secretary; John F. Stevens, president of the Boston Central Labor Union; and Galen L. Stone, banker, member of the firm of Hayden, Stone & Company.

The original board remained intact only a few months. Mr. Frothingham resigned on Oct. 25, 1918, to enter military service. Samuel L. Powers was appointed in his place. Mr. Powers was an ex-congressman, a lawyer, senior partner of the firm of Powers & Hall, and prominent in public utility enterprises.* Mr. Butler was chosen chairman in Mr. Frothingham's place, but remained on the board only until Dec. 16, 1918. He resigned on account of demands of his law practice and other interests.

Mr. Butler's successor was James F. Jackson, lawyer and former chairman of the Massachusetts Railroad Commission. He was immediately made chairman and served as such during his service of more than 6½ years on the board.†

Mr. Stone presented his resignation to the new Governor, Calvin Coolidge, and in accepting it the Governor wrote: "I appreciate that your health is such that it would be hazardous for you to continue." Mr. Stone's successor was Winthrop Coffin, broker, member of the firm of Perry, Coffin & Burr.** After he became a member, in February, 1919, the board remained intact until the death of Mr. Stevens, in 1922.

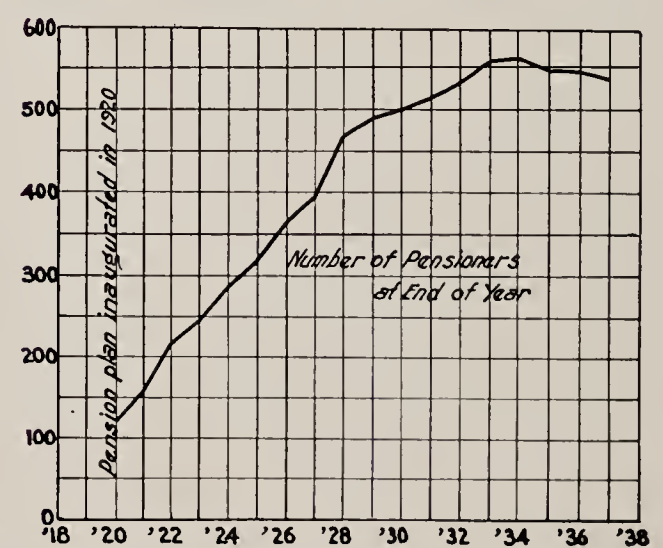
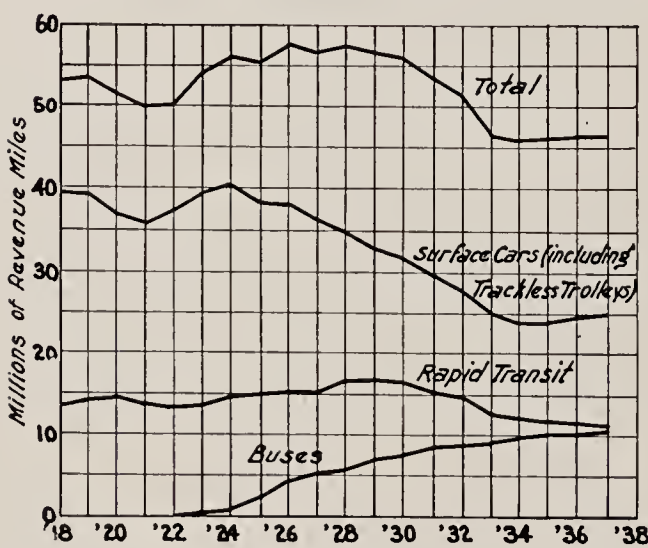
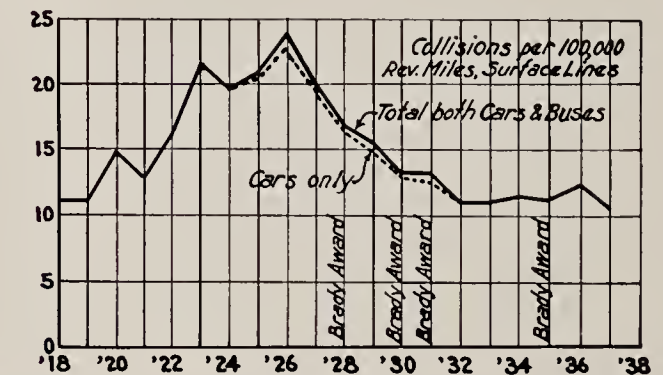
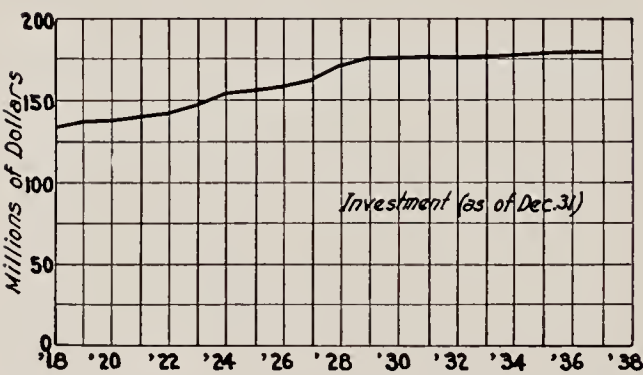
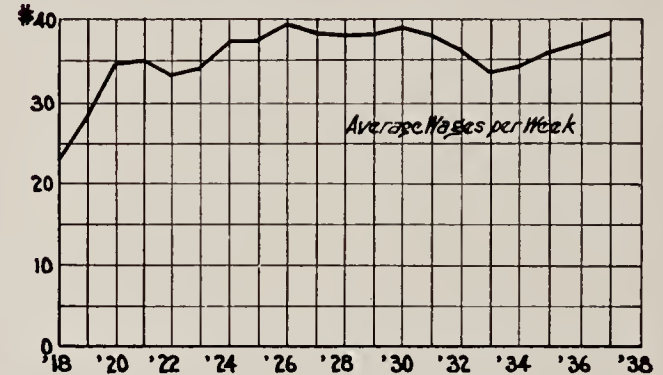
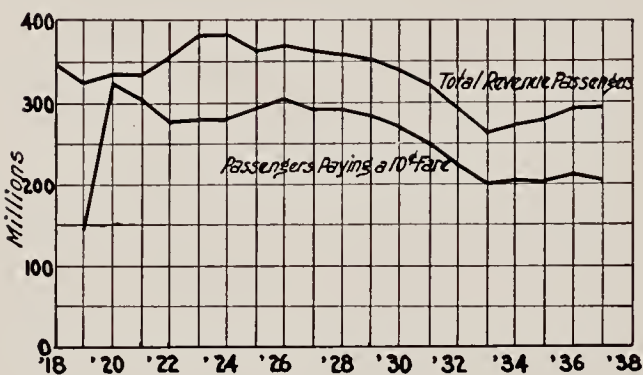
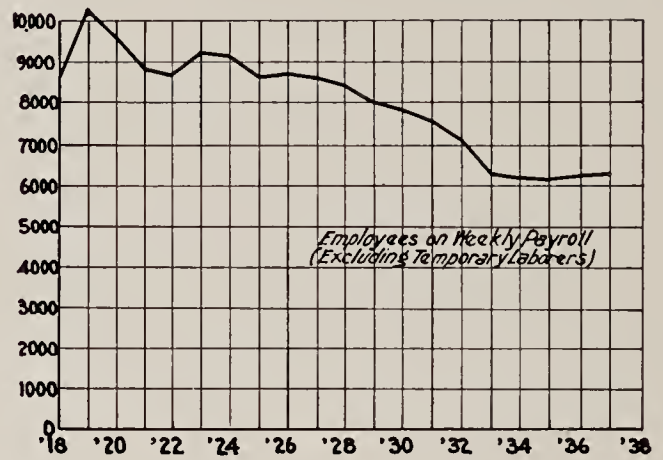
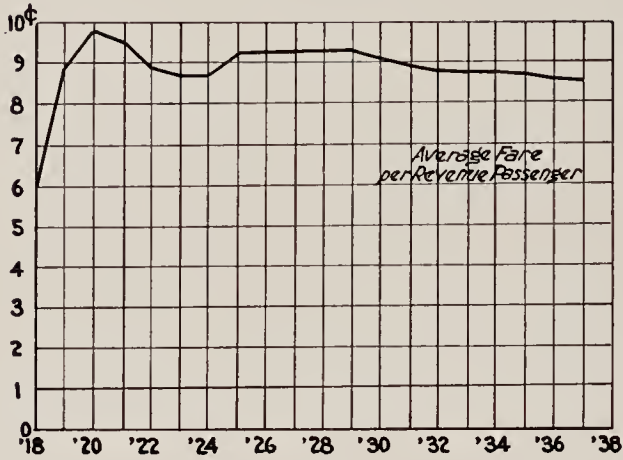
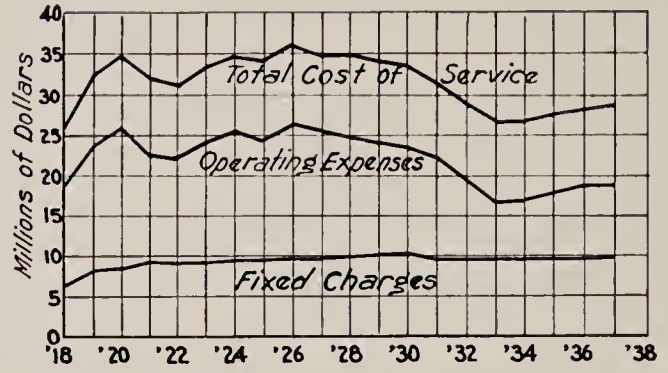
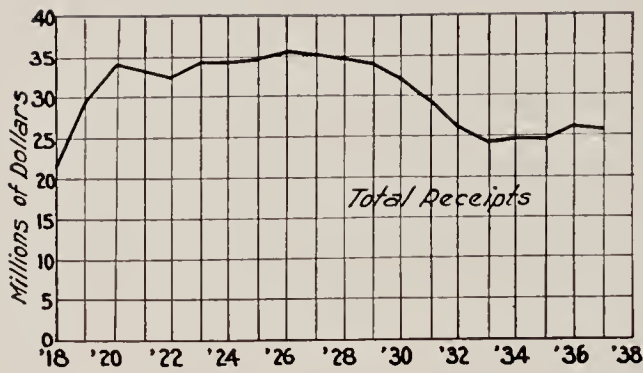
TRUSTEES FACED DIFFICULT PROBLEMS

WHEN the trustees assumed responsibility for the Railway property on July 1, 1918, they were confronted by emergency conditions, but they were empowered to adjust the fare to meet "all costs of furnishing the service." The property on the whole was in poor physical condition. Except for the Cambridge-Dorchester rapid-transit cars and a few hundred semi-convertible

* Mr. Powers remained on the board until the expiration of its term in 1928. He was chairman for more than 3 years at the end of the term. He died Nov. 30, 1929.

† Mr. Jackson resigned on Aug. 12, 1925, to devote himself to his law practice, in which he continued until his death on Apr. 25, 1937, at the age of 85 years.

** Mr. Coffin remained on the board until the expiration of its term, in 1928.



SALIENT DATA OF PERIOD OF TRUSTEE CONTROL

("No. 4") and center-entrance motor cars and trailers, the rolling-stock was obsolete. The surface track was far behind in maintenance.

The 5-cent fare had not provided a margin for an adequate depreciation reserve from which the property could be properly maintained. In 1917, toward the end of the period of private operation, John A. Beeler, consulting engineer for the Public Service Commission, had reported to the Commission that, exclusive of track and overhead (chargeable to maintenance), the depreciation on the property in 1916 had been more than \$1,400,000. The company had provided \$140,000; or one-tenth of what should have been provided. There was also nearly \$550,000 which should have been charged off for discarded property, or approximately \$1,960,000 in all. Mr. Beeler estimated that \$2,700,000 per year should be expended for rehabilitation over a 5-year period.

One of the first acts of the trustees, after reviewing Mr. Beeler's report, was to vote a monthly general depreciation credit of \$167,000 (or an annual rate of \$2,004,000) beginning with July, 1918. This was to cover, as listed by Mr. Beeler: Use, age, change in market value, inadequacy, obsolescence.*

In addition to a run-down property, the trustees found a wage-increase problem on their hands. The World War, in producing a temporary prosperity, had boosted prices. Toward the close of the period of private operation (in February, 1918) Henry B. Endicott, executive manager of the Massachusetts Committee on Public Safety, serving as a voluntary arbitrator at the request of Governor McCall, had recommended that a flat increase of two cents per hour be paid during the remainder of the term of the existing agreement between the Railway and the Carmen's Union, ending May 1, 1919. This recommendation had been accepted by the Company and the men.

The National War Labor Board (Hon. Wm. H. Taft and Basil M. Manly, joint chairmen) came into the labor picture at this juncture, as arbitrator, on the application of the employees for increased wages. An award for the duration of the War was made on Oct. 2, 1918, which, with a supplementary award, increased annual wages about \$3,000,000.

On the expiration of the agreement in 1919, another arbitration resulted in a further increase of about \$2,400,000; and similar

* The depreciation credit, or reserve, which has been regularly set aside since July, 1918, has enabled the trustees to maintain the property in good operating condition, and to replace worn-out, or obsolete equipment. The amount set aside was maintained at \$2,004,000 per year until 1923, and the range since then has been between \$2,878,054.52 (1929) and \$2,304,096.56 (1933). The amount is determined by the trustees from year to year upon the basis of a careful computation of the estimated life of the parts of the physical plant.

procedure in 1920 resulted in an additional increase of about \$2,300,000. Thus within a 2-year period, wages were increased by about \$7,700,000 per year.

Not only did wartime conditions increase labor cost, but the Railway had to pay more for materials. Coal alone, for example, cost nearly \$630,000 more in the calendar year 1918 than in 1917. By 1920 the cost of coal was 130 per cent greater than in 1917. Total operating expenses increased over 90 per cent in this period.

To cap the climax of their difficulties, the trustees found operation complicated by snow in their second winter (1919-20). The direct cost of handling snow was about \$600,000. Indirect costs, including loss of traffic, brought the total close to a million dollars.

MR. BRUSH AND MR. SERGEANT RESIGN

IT was the hope of the trustees that Mr. Brush would continue, as president, to direct the operation of the Railway. He resigned, however, in October, 1918, to enter the shipbuilding field. Vice-president Sergeant resigned in November, 1918.

Mr. Brush's place was filled by the promotion to the presidency of J. Henry Neal, vice-president and general auditor; and C. D. Emmons, previously of Worcester, was appointed general manager. Both resigned after short terms, and during 1919 a personnel set-up which was to remain substantially intact for many years was adopted.* No successor to Mr. Neal as president was appointed until Jan. 1, 1937, when Mr. Dana, who as general manager had in the meantime been the chief executive officer, became president as well as general manager. Mr. Dana is now in his nineteenth year as chief executive, the longest term served by anyone in that capacity. Under his administration the "El" system was rehabili-

* The appointments of the trustees were: Edward Dana, general manager; Henry L. Wilson, treasurer; John H. Moran, general auditor; H. Ware Barnum, general counsel; Russell A. Sears, general claims attorney; H. Bertram Potter, assistant general manager; Edward Mahler, purchasing agent; Charles B. Gleason, clerk of the corporation and attorney; Daniel Prendergast, real estate agent; Clarence E. Learned, superintendent of inspection; James Smith, superintendent of transportation; Frederick S. Freeman, superintendent of power; John Lindall, superintendent of rolling-stock and shops; Harry M. Steward, superintendent of maintenance.

Changes in the above roster have been as follows: Mr. Dana, on Jan. 1, 1932, became vice-president and general manager, and on Jan. 1, 1937, president and general manager; Mr. Moran on March 23, 1936, became vice-president and comptroller, and on Jan. 1, 1937, vice-president and treasurer, succeeding Mr. Wilson who retired on Jan. 1, 1937; Michael H. Cullen on Jan. 1, 1937, succeeded Mr. Moran as general auditor; Mr. Barnum died on Nov. 22, 1936, and was succeeded by Willis B. Downey; Mr. Sears died on July 22, 1932, and was succeeded by Maurice P. Spillane; Mr. Potter resigned on Sept. 1, 1923, to become assistant to the president (later general manager) of the United Electric Railways, Baltimore, Md., and no assistant general manager has since been appointed; Mr. Mahler died on May 17, 1934, and was succeeded by J. Garfield Stone; Mr. Prendergast died on July 28, 1920, and no successor as real estate agent has since been appointed; Mr. Learned died on Aug. 27, 1924, and was succeeded by Frank I. Wilkins; Mr. Smith died on May 13, 1935, and was succeeded by Dares D. Hall; Mr. Lindall became advisory equipment engineer on July 1, 1936, and was succeeded by Ralston B. Smyth.

tated, modernized, and brought to the point where it gave the best possible service within the limitations of the fares collected.

GETTING THE PROPERTY ON ITS FEET

OBVIOUSLY the trustees could not do much in their first year or two to bring the property up to the desired condition. Money was still scarce. However, some modern cars were purchased, equipment was improved, and surface-car train operation was expanded.

The extension of the elevated structure to Everett and the Everett Terminal were completed in the spring of 1919, and opened on March 15. It had been the original idea to extend this line to Malden.

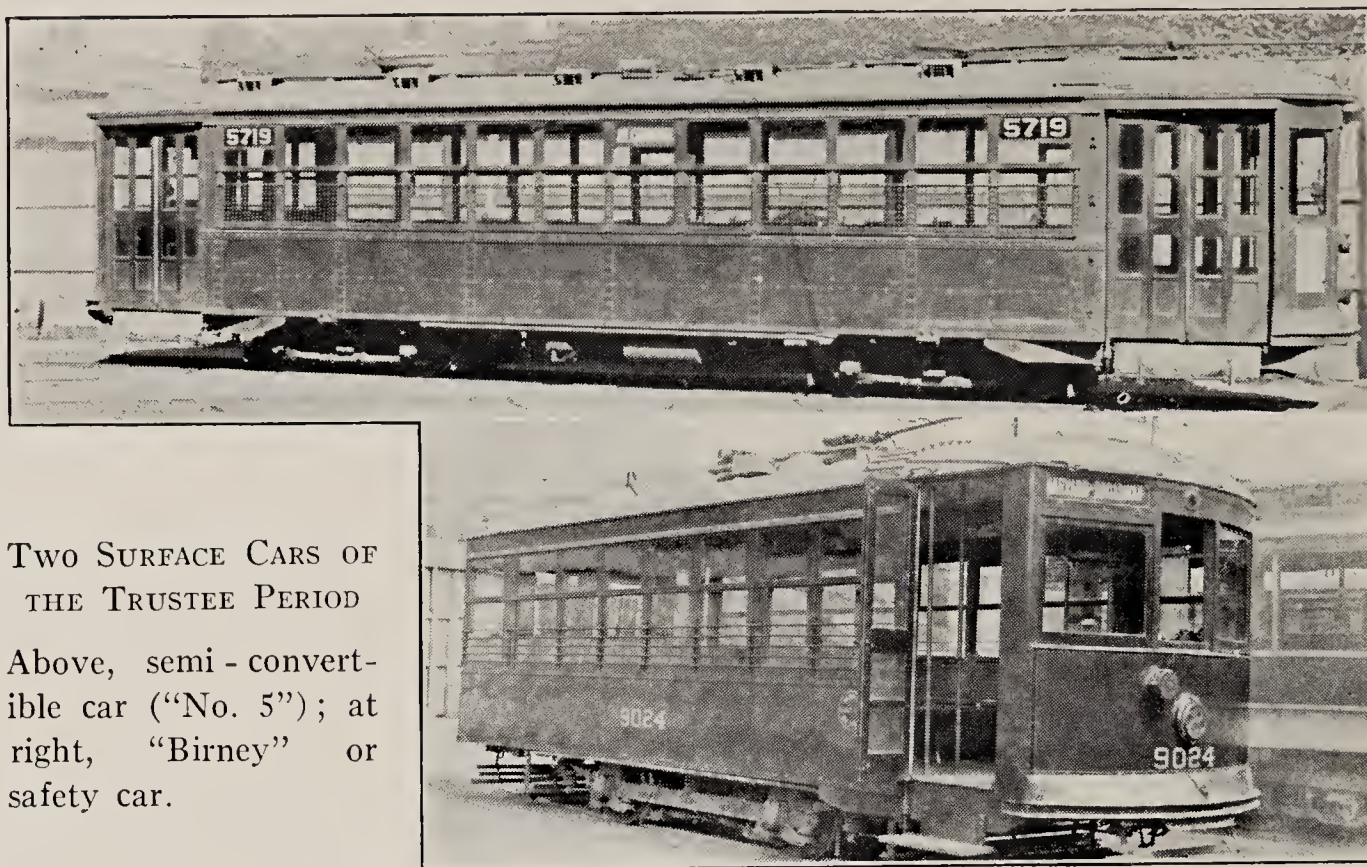
The new cars, referred to, were principally center-entrance cars; both motor cars and trailers. The motor cars were of the type commended by Mr. Beeler, in his report to the Public Service Commission. They were equipped for train operation. One hundred were in service when the trustees took control. They bought 200 more in 1919 and 105 in 1921. There are 264 of these cars now in active service.

To 175 center-entrance trailers in service in 1918, the trustees added 50 in 1919. Most of these were available for rush-hour service until 1933, but have since been gradually discarded as obsolete. Mr. Beeler had recommended that these trailers be equipped with motors, but this was not considered feasible by the management.

In 1918 there was great interest throughout the country in a so-called "safety car," or "Birney car," which was an attempt to produce a standard design for quantity production of a small, single-truck car, equipped with safety devices for 1-man operation.



MODERN TRACK CONSTRUCTION, WESTERN AVENUE, CAMBRIDGE



TWO SURFACE CARS OF THE TRUSTEE PERIOD

Above, semi - convert-
ible car ("No. 5"); at
right, "Birney" or
safety car.

The trustees bought 80* "Birneys," but used them for only a few years, the Elevated experience being similar to that of most other properties, which found that a double-truck car was much more satisfactory. The Birney car, however, demonstrated the practicability of 1-man operation.

During 1921 a new design of large surface car, the so-called "No. 5 semi-convertible" car, was developed by the Railway's engineers. This was much lighter than the "No. 4 semi's," of which the Railway had 275 in 1918, and of which 266 are today still in serviceable condition. The "No. 5's" were designed in accordance with a general car-weight-reduction movement in the electric railway industry. They were not designed for multiple-unit, or train, operation. The first orders of 70 of these cars were delivered in 1922. The design proved so satisfactory that it became the Railway's standard for surface cars. Additional orders were promptly placed for the "No. 5's," and within five years there were 460 in service, practically all, together with a few added later, in everyday use today.†

* The Railway had previously purchased a sample car.

† No new surface cars were bought after 1928, when a few "No. 5's" were bought, until 1937, when a sample "P. C. C." (Presidents' Conference Committee) car was added to the rolling-stock for experimental purposes in regular service on the Charles River line, in the Roslindale section. It embodies the results of researches made under the auspices of the American Transit Association, with the financial and technical assistance of railway managements and manufacturers.

In connection with the purchase of the Chelsea Division of the Eastern Massachusetts Street Railway on June 9, 1936, the Railway acquired 54 surface cars previously operated by that company.

On the rapid-transit lines, steel cars were substituted for wooden elevated cars in 1921, 1922, 1927 and 1928; a total of 48 cars were purchased for the East Boston tunnel during 1923 and 1924; and 60 cars were added on the Cambridge-Dorchester line in 1927 and 1928.

In addition to surface cars described above, the rapid-transit rolling-stock was increased in 1919 by the delivery of 35 additional Cambridge-Dorchester tunnel cars, of the type shown on page 130 of the December, 1937, issue of "Co-OPERATION."

ONE-MAN OPERATION A NECESSITY

THE sudden and substantial increases in wages which marked the early years of the trustee period forced attention to 1-man car operation, where feasible. Experience elsewhere had shown its possibilities; and the 81 cars, of the so-called "safety" type, which had been purchased by the Railway, were designed specifically for 1-man operation.

The Railway had to convince the public of the inherent safety of 1-man operation, with its undivided responsibility. Gradually this type of operation spread, until in 1937 more than 88 per cent of the surface-car mileage, as well as all bus and trackless-trolley mileage, was 1-man operated.

FARE ADJUSTMENTS

UNDER the Public Control Act the trustees were empowered to charge such fares as would make the service really self-supporting. One month after they took office, they raised the fare to 7 cents, and four months later to 8 cents; but in spite of this, and on account of the mounting expenses already mentioned, a deficit of nearly \$5,000,000 piled up by the end of June, 1919. In July, 1919, the fare was set at 10 cents, and by 1921, with a total revenue 68 per cent greater than in 1917, a substantial surplus was built up.

During 1921, experiments were made with a 5-cent fare, without transfer, on short lines where there was little competition with 10-cent lines. As a result, nearly 20 per cent of the total riding was at a 5-cent fare by the end of the year.

While adjusting the fare structure of the Railway, the trustees employed, as consultants, the late Prof. A. S. Richey, of Worcester, Mass., and Peter Witt, of Cleveland, Ohio. At their suggestion, the zone plan of fares was considered, but it was found not to be feasible locally.

The rapid increase in the 5c riding reduced correspondingly the average fare, which fell from nearly 9.9c in 1920 to about 8.7c in 1923. A wage increase of a half-million dollars annually resulting from arbitration in 1924, necessitated a fare increase from 5c to 6c, effective Nov. 5, 1924, and the fare was further increased to

6¼c July 1, 1927, i.e., four tickets for a quarter. Corresponding tokens were introduced Sept. 14, 1929, for use in the recently adopted automatic passimeters.

At this mid-period of trustee control the riding and revenue had been good for several years, and the 6¼c local fares were discontinued on Aug. 31, 1930, and 5c fares for local rides were resumed on Sept. 1, 1930. At that time, the riding was already falling off, due to the depression. The 5c riding, however, was holding up, and has since held up, better than the 10c riding. Accordingly, the average fare has decreased. In 1937 it was 8.54c as compared with 9.28c in 1928 and 1929.

Referring again to the automatic passimeter, this was experimented with on a small scale in 1926, and its use, wherever practicable, was rapidly extended. A late addition to this device was a "slug" detector, by means of which the use of bad coins was reduced from over 100,000 in 1931 to under 20,000 in 1937.

CAMBRIDGE SUBWAY SOLD

THE financial burdens of the management were lightened somewhat, on May 1, 1920, by the sale of the Cambridge subway to the Commonwealth for \$7,868,000.* With the sanction of the Department of Public Utilities, this money was used partly to pay off several million dollars worth of West End bonds, to finance improvements of both the West End and Boston Elevated properties, and to pay part of the cost of the first units of the Everett shops and the Forest Hills rapid-transit train yard.

WEST END ABSORBED BY "EL"

ON June 10, 1922, nearly 25 years after the lease of the West End Street Railway by the Boston Elevated Railway, it was consolidated with the "El," in accordance with legislation passed in 1911.†

The consolidation was effected by exchange of the outstanding preferred and common stocks of the West End, at par, for an equal amount, at par, of the 1st preferred and 2nd preferred stocks, respectively of the Boston Elevated. The existing "El" preferred stocks became the 3rd preferred. The return on par to the investors remained unchanged.

* The Commonwealth has, in the 18 years since 1920, increased its investment in the Cambridge subway to \$8,226,759.52, by the construction of the Charles Station, reconstruction of the Harvard square headhouse, and other improvements. The Railway paid \$404,652.50 in rental for the use of this subway in 1937.

† Chap. 740, Acts of 1911.

This consolidation greatly simplified the Railway's accounting procedure, and eliminated dual control of maintenance and improvement in the plant.

THE EVERETT SHOPS

IN studying the car repair facilities of the Railway in the first years of trustee control, the management concluded that better shops were needed. To quote the trustees:* "The present shops of the company are old, inadequate and widely scattered. A car in the overhauling process must be moved from place to place, causing useless expense and loss of time. With shops scattered in various localities there is wasteful and unnecessary outlay in wages and material, and duplication of machinery and tools."

As early as 1916, a committee had recommended that general repair shops be built on a tract adjoining the projected Everett Terminal of the elevated lines. At this point more land had been purchased than was needed for the terminal, although not enough for the proposed shop site. Money for carrying out the recommendation had not been available under private management of the property. The trustees determined to proceed with this plan, and to finance the development by the sale of bonds and the use of part of the proceeds of the sale of the Cambridge subway which the Legislature had authorized.†

A comprehensive layout of complete centralized shops was prepared, and as an initial step, the wood shop and mill room, and the paint shop, with related smaller shops, and a boiler house were built. These permitted the transfer of surface-car work being done in obsolete shops on the tract at Washington and Bartlett streets; shops which had been erected in 1887, for horse-car maintenance, by the Metropolitan Railroad, one of the street railway systems which combined to form the West End Street Railway.

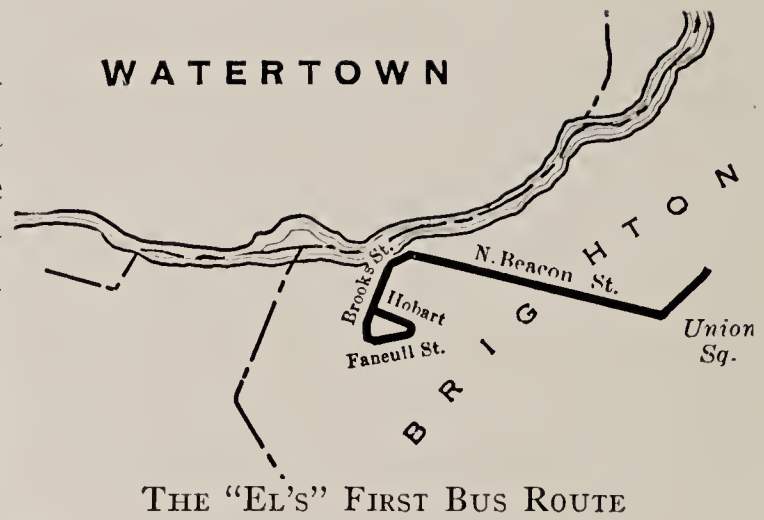
On recommendation of the consulting engineers, a layout of the shops which was termed a "transverse shop" was adopted. In a transverse shop the tracks are crosswise of the buildings, a transfer table being used to connect the tracks of opposite buildings. The alternative was a "longitudinal shop," in which the tracks run lengthwise of the buildings.

The first unit of the new shops was completed in December, 1923, and the repair units were transferred from Bartlett street on

* House document No. 103, January, 1921, page 2.

† The Department of Public Utilities, on petition from the trustees and after a hearing, directed that \$1,000,000 of the \$7,868,000 paid by the Commonwealth for the Cambridge subway be appropriated for the Forest Hills terminal yard and the Everett shops.

March 1st, 1924.* No material changes were made at Everett from 1924 until the present year. There is now under construction a new building which will house the machine, pattern, truck and armature shops, all of which are on the Albany street site.



THE MOTOR BUS ON THE "EL"

THE first experiment with the motor bus by the Railway was made in 1922, when, on Feb. 24, service was begun on a 1½-mile route between Union square, Allston, and the North Beacon street bridge over the Charles River.† Two regular buses and one spare were required for this service.

On this route the compelling reason for replacing street cars with buses was that the track on North Beacon street needed to be replaced and there was not enough business to warrant doing so. Buses offered a substitute for cars.

The types of buses available in 1921 and 1922 were crude, compared with present-day standards; they were passenger trucks rather than buses. However, the bus had developed far enough to warrant a trial; in 1922, a total of 63,937 bus-miles were operated.

* The Bartlett street shops were taken down in 1928 and 1929.

† The petition for this route was presented to the City Council of Boston on Oct. 29, 1921. The extensions shown in the map above were added later to the original route.



THE FIRST MOTOR BUS ON THE BOSTON ELEVATED

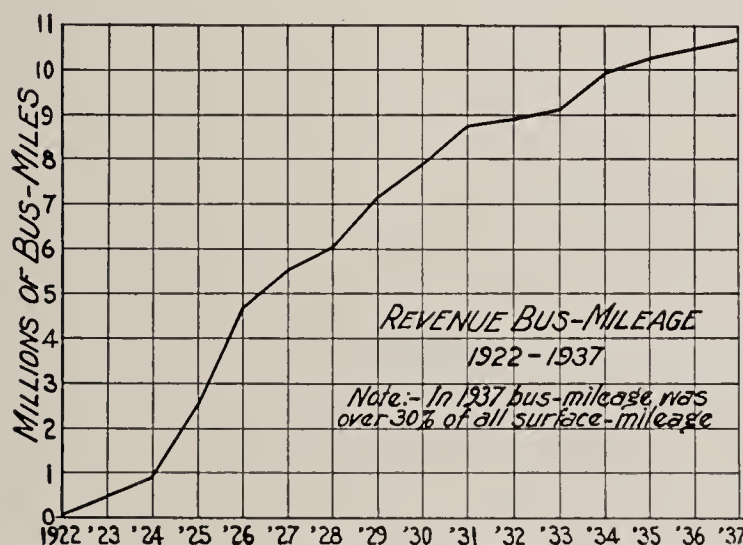


RECENT TYPE OF MOTOR BUS EQUIPPED WITH DIESEL ENGINE

This trial was successful, and the bus lines were rapidly increased. By the end of 1925, there were 25 routes in operation, with 157 buses. The 1925 revenue bus-mileage was nearly $2\frac{1}{2}$ million bus-miles, or about $4\frac{1}{2}\%$ of the total revenue mileage.* In that year more than \$15,000 was received from special bus service.

From 1925 to the present time there has been a continued increase in annual bus mileage. Meanwhile, the bus design has improved greatly, and the early buses have long since been replaced. The Railway had 465 buses in operation on Dec. 31, 1937, including 10 equipped with Diesel oil engines and electric drive.

The management had early adopted a receptive attitude toward the motor-bus, with a view to fitting it into the existing street-car and rapid-transit services. In the trustees' annual report for 1925 appeared this statement: "Upon lines where traffic is not



sufficient to warrant the heavy investment in track and electric system, or where streets are so narrow or congested by vehicular traffic that the electric car is continuously blocked and delayed in its passage, the motor-bus fills an important place."

* In 1937, the mileage was over $10\frac{1}{2}$ millions, or more than $22\frac{1}{2}\%$ of the total revenue-mileage. The special bus revenue was over \$70,000.

PENSION PLAN STARTED IN 1920

BEFORE the Railway came under public control, superannuated employees were being assisted by gratuities from the Company. After study of pension plans in operation elsewhere, one of the early acts of the trustee period was to adopt a systematic plan of pensioning employees, with an overall limit of cost of 2 per cent of the payroll. The Boston Elevated plan was an extension of the practice of granting gratuities, with no employee contributions. Pensions were based principally on age, average earning power during a period prior to retirement, and length of service. All employees were made eligible to receive benefits upon retirement.

Pensions under this plan have been granted since February, 1920. Beginning with about 100 former gratuitants, who received under the new plan an average of about \$27 per month, the number of pensioners grew steadily, until by 1929, there were nearly 500 pensioners and the average rate was well over \$50 per month.

The monthly payments were reduced in 1929, 1933 and 1934 in order to keep within the stipulated limit of 2 per cent of the total payroll. In recent years the list has not expanded much, running not over 550 names. The average pension is now slightly under \$33. As of Jan. 1, 1938, the average age of pensioners was 73.8 years; the average age when pensioned 66.4 years; the average length of service 36.8 years, and the total annual pension \$217,200.

The pension plan was, and still is, administered by a standing, or regular, pension committee.

EXTENSIONS OF THE "EL" SYSTEM AND OTHER PLANT IMPROVEMENTS

WHILE the period covered by the preceding section of the history was the one most notable for new construction and other extensions of the Railway's system, expansion continued during the trustee era.

Due to pressure from the residents of the Hyde Park section, the City of Boston purchased the tracks in Hyde Park from the Eastern Massachusetts Street Railway Company, and in 1923 a portion of these tracks was leased by the City of Boston to the Boston Elevated Railway, service beginning September 1, 1923.

The most extensive and far-reaching expansion, however, was the extension of the Cambridge-Dorchester tunnel route from its terminus at Andrew Square to Ashmont.

In 1923, the so-called "rapid transit bill" was signed by Governor Cox, which included a provision for use for this purpose of a double-track right-of-way, belonging to the New Haven Railroad, to Harrison square and the entire length of the Shawmut Branch from that point. After the necessary negotiations had been completed, the project was promptly undertaken and progressed steadily. The first section included the extension of the tunnel from near Andrew square terminal, under Boston street, to the New Haven right-of-way. It was opened to Fields Corner on Nov. 5, 1927.

The next section of the project extended to Ashmont, and in this section the railroad right of way was through a deep cut with some grade crossings. After consideration of the cost of abolishing the remaining grade crossings, and of operating difficulties that would be encountered in the winter on account of snow, it was found more economical to provide sidewalls and a roof, thereby creating a covered section. This section, including the terminal at Ashmont, was opened for use on Sept. 1, 1928.

In addition to the terminal at Ashmont, providing for interchange of passengers between the 3rd rail trains, trolley cars and buses, a yard was provided on property purchased by the City to the west of the railroad right-of-way and on the south side of what is now the Gallivan Boulevard. From the Ashmont Terminal the trackage was rebuilt, as well as the stations, to provide high-speed service by trolley cars between that point and Mattapan. This section of the high-speed trolley line was opened for service on Dec. 21, 1929.

At Mattapan, a large storage yard for trolley cars was provided, as well as means for interchanging between car lines operating on highways and the high-speed trolley line and buses.

The City of Boston not only purchased the right-of-way on



INTERCHANGE POINT BETWEEN SURFACE CARS AND BUSES ON BOYLSTON STREET
Portal of subway can be seen in background.



STEEL CAR USED IN EAST BOSTON TUNNEL

the Shawmut Branch from the New Haven, but also paid for the construction and equipment, except rolling-stock and some power apparatus. The cost to the City of Boston was about twelve and one-third million dollars.

On Feb. 27, 1932, an additional station on the Cambridge-Dorchester route was provided within the traffic circle at Charles street. As the State of Massachusetts owns the Cambridge subway and the elevated structure from the Boston end of the West Boston (Longfellow) bridge to the Beacon Hill tunnel, the station was erected by the Department of Public Utilities. This station, known as "Charles," was built largely to accommodate persons going to and from the Massachusetts General Hospital and the Eye and Ear Infirmary nearby.

THIRD-RAIL OPERATION FOR EAST BOSTON TUNNEL

THE East Boston tunnel, between Maverick square in East Boston and Bowdoin square in Boston, was constructed for trolley-car operation.* The cars entered the tunnel *via* an incline from Meridian street in East Boston and, for eleven years, terminated at Court street. When the tunnel was extended to Bowdoin square, a loop was provided so that it was no longer necessary to shift ends. West of Bowdoin square, a double-track incline was provided to Cambridge street, so that cars could enter and leave the tunnel from this end as well as from the East Boston end.

Traffic in the tunnel increased steadily from a weekday average of 33,118 passengers in 1905 to about 79,000 in 1923. This was the capacity limit with surface cars. The logical step was to go to 3rd rail trains. This required the construction of a terminal

* The original tunnel from Maverick square to Court street was opened on Dec. 30, 1904. It was later extended to Bowdoin square, and through operation began on March 18, 1916. See page 60, and page 62 (footnote).

in Maverick square, with provisions for looping the 3rd rail trains, and also looping the trolley cars entering the terminal from Meridian street. A short section of tunnel was extended under Chelsea street from the Maverick square terminal, to be used for the time being for storage tracks and an inspection shop.

The construction of the terminal was extremely difficult, as it was necessary to continue the safe operation of trolley cars while these extensive changes were being made. After the terminal had been completed, the tracks for the entire length of the tunnel were rebuilt as far as was necessary and a 3rd rail was installed; the station platforms were raised to the high level, the trolley cars removed and 3rd rail cars brought in, this work being done over a week-end, including a public holiday. Service with 3rd rail trains was inaugurated on Apr. 21, 1924.

The 3rd rail cars used in the East Boston tunnel were built smaller than other rapid-transit cars, due to the bore of the tunnel. The cars weigh less, and are smaller over-all, than the center-entrance cars which they replaced. Due to the use of longitudinal seats, large standing capacity is provided, which is permissible, because the run is comparatively short.

The limit of surface cars through the tunnel was 121 cars per hour, even when connected up in 3-car trains. Rapid transit with 6-car trains doubled the possible number of cars per hour, and increased by 136 per cent the passenger capacity.

These improvements brought the total cost of the tunnel and equipment up to more than 9 million dollars. The Railway in 1937 paid more than \$433,000 in East Boston tunnel rentals.*

BOYLSTON STREET SUBWAY IMPROVED

IN the Boylston street subway as originally built† there was no station between Boylston street and Copley.

In response to a demand for a station approximately midway between these points, one was constructed between Arlington and Berkeley streets, with entrances and exits at both of these streets.

* From the issue of the *Electric Railway Journal* for Apr. 26, 1924:

"By joining forces with the Boston Transit Commission, so as to muster a working crew of about 800 men, the Boston Elevated Railway changed over the service in the East Boston Tunnel between 8 o'clock on the evening of April 18 and 5 o'clock on the morning of April 21 from the surface cars to the operation of four-car trains. It was a stupendous job. The tunnel was closed to the public during the fifty-seven hours. Then the crossovers were broken, the guard rails taken down, the third rail installed for a distance of 2 miles and platforms erected at the several stations. This was work which could not be done until the surface cars ceased running. Its completion was accomplished in record time, however, as everything was ready for the work the minute the cars were out of the tunnel. All the platforms had been built in small sections which fitted together like a picture puzzle. The third rail had been welded together in lengths of 400 ft., all ready to set in place."

† It was opened for service on Oct. 3, 1914.

OPENING DATES—SUBWAY AND ELEVATED LINES 1918 (Second Half) to 1937

| | | DATE OPENED | |
|-----------------------------|----------------------------------|-------------|----------|
| Tremont St. Subway..... | Park St. Station | | |
| | Upper Level Enlargement..... | Dec. | 5, 1936 |
| Elevated Lines..... | Everett Extension, | | |
| | Sullivan Sq. to Everett Sta..... | Mar. | 15, 1919 |
| East Boston Tunnel..... | Change to 3rd-Rail Operation. | | |
| | New Terminal at Maverick | | |
| | Station | Apr. | 21, 1924 |
| Boylston St. Subway..... | Mass. Ave. Surface Station..... | Nov. | 29, 1919 |
| | Arlington Station | Nov. | 13, 1921 |
| | Kenmore Extension | Oct. | 23, 1932 |
| East Cambridge Viaduct..... | Lechmere Sq. Station..... | July | 10, 1922 |
| | North Sta., Changes Acct. of New | | |
| | B.&M. R.R. Station..... | Oct. | 20, 1928 |
| | North Sta. West,, Changes Acct. | | |
| | of New B.&M. R.R. Station.. | Nov. | 3, 1928 |
| Cambridge Subway and | | | |
| Beacon Hill Tunnel..... | Charles Station | Feb. | 27, 1932 |
| Dorchester Tunnel..... | Broadway Surface Station, South | | |
| | Boston | May | 31, 1919 |
| | Andrew to Fields Corner..... | Nov. | 5, 1927 |
| | Fields Corner to Ashmont..... | Sept. | 1, 1923 |
| | High-Speed Trolley, Ashmont to | | |
| | Milton | Aug. | 26, 1929 |
| | Milton to Mattapan..... | Dec. | 21, 1929 |

As this station had to be constructed under traffic, the work was difficult and the cost was correspondingly high. The station was opened for use on Nov. 13, 1921.

The rental for this station is included in the nearly \$300,000 paid annually for rental for use of the Boylston street subway.

GOVERNOR SQUARE IMPROVEMENT

THE Boylston street subway originally came to the surface in Governor square, the head of the incline terminating at Kenmore street. The Boston Elevated Railway constructed platforms and an enclosed area in the square. Commonwealth avenue and Beacon street, as well as several intersecting streets, cross at Governor square. Street cars and automotive traffic, therefore, caused congestion and delay at this point.

Many proposals were considered to eliminate this congestion, and it was finally decided to extend the Boylston street subway to connect with the tracks on Beacon street in the reservation at St. Mary's street, and to the Commonwealth avenue reservation near Blandford street, with an underground station in the square.

This station, known as "Kenmore", is on the site of the former Back Bay, and special waterproofing and drainage problems were involved in its construction. A conduit, or sewer, carrying surface drainage and part of the flow of Muddy River, passes through the square near the station, so that an inverted syphon had to be built at this point to carry the sewer across the line of the subway extension.

The extension of the subway and the construction of the station were handled by the Boston Transit Department, at a cost of nearly five million dollars. The new station was opened for service on Oct. 23, 1932.

PARK STREET STATION ENLARGED IN 1936

A FEW years later, the Transit Department, as a W.P.A. project, built a platform on the east side of the northbound track under Tremont street, this platform connecting with all of the existing platforms in the Park street station by a sub-passageway. Entrances and exits were provided on the east side of Tremont street at Temple place. As this was a W.P.A. project the Railway pays rental only on a part of the cost of this improvement. This new platform was opened for use on Dec. 5, 1936.

CHELSEA AND REVERE LINES PURCHASED

EARLY in the trustee period there was public agitation for the consolidation of the Chelsea division of the Eastern Massachusetts Street Railway with the "El" system. The purpose was to secure lower fares to and from points in Chelsea and Revere.

Legislation was in progress in 1924, but the question of price was the outstanding obstacle. It was, in fact, not until June 9, 1936, that the final papers consummating the matter were filed. On the following day the Railway began operation of most of the former Chelsea division, which became part of Div. 3 of the Boston Elevated. The cost to the Railway was \$1,500,000.

HUNTINGTON AVENUE SUBWAY

As this is written, the Huntington avenue subway, connecting with the Boylston street subway at Exeter street, is under construction. It will dip below the Boston & Albany Railroad tracks, and come to the surface on Huntington avenue near the intown end of Mechanics Building. All street cars now operating on Huntington avenue, from about Exeter street, and on Boylston street will be routed through the new subway.

The Huntington avenue subway is a W.P.A. project, and is being built by the Boston Transit Department. The cost is estimated at slightly more than two million dollars, of which the City will pay about 38 per cent and the federal government the balance. The length of this section will be approximately 1200 feet. It is so constructed at the outer end, however, that the subway can be readily extended at a later date.

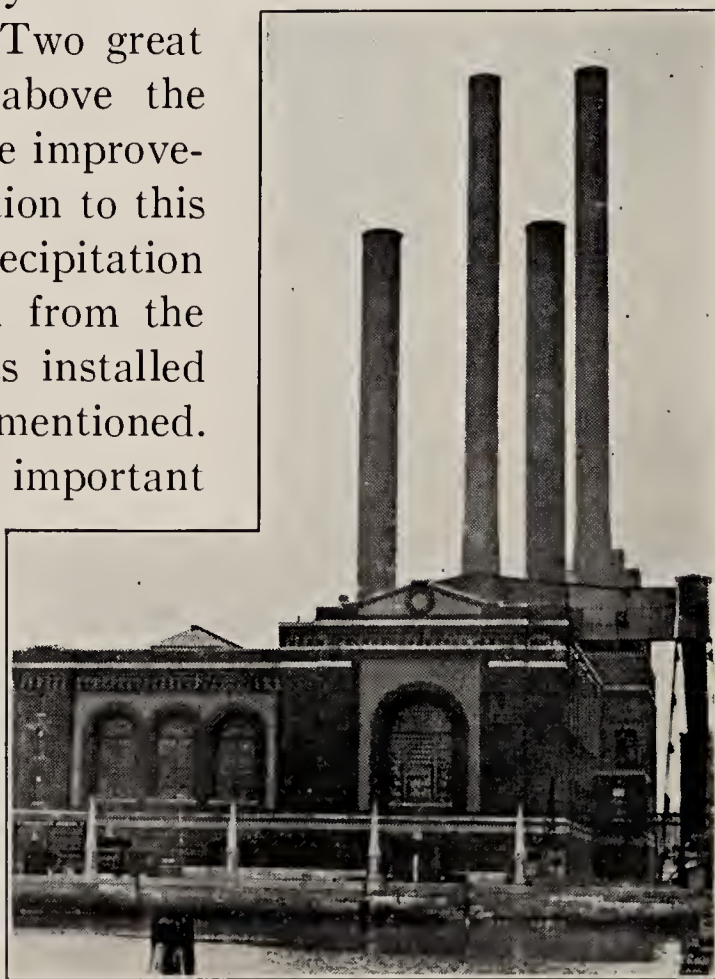
THE "EL" POWER PLANTS

IN 1911 the Boston Elevated adopted the modern alternating current system of power generation and distribution, and built an up-to-date power station in South Boston.* To the original three 15,000-kilowatt turbine units in this station (which today are used only as reserve units), a 35,000-kilowatt turbine unit was added in 1917. The capacity of this unit was increased in 1922 to 40,000 kilowatts. A 35,000-kilowatt turbine unit, installed in 1924, brought the rated capacity to 120,000 kilowatts, or about 160,000 electrical horsepower.

In 1923 and again in 1927, several notable improvements were made in the boiler section at South Boston, to increase the plant efficiency by taking advantage of available improvements in power generation equipment.

In 1923, two large boilers were installed, which could, in a high-grade station such as this, generate enough steam for a 30,000-kilowatt turbine. These boilers produced a high pressure for the time, 300 pounds per square inch. In 1927 two additional boilers were installed, the novel feature of which was the adoption of pulverized-coal equipment for firing. In the firing aisle in front of the boilers there were three pulverizing mills for each boiler, supplied with coal from a traveling lorry overhead. The pulverized fuel was blown into the furnaces by warmed air, delivered by rotary fans. Two great steel stacks, rising 355 feet above the ground, were built as part of the improvements. A still more recent addition to this boiler plant was an electrical precipitation apparatus for removing fly-ash from the flue gases. This equipment was installed in the uptakes of the boilers mentioned.

The Railway's second important power station, the Lincoln Wharf station, is older than the South Boston plant. It was built as part of the elevated railway development in 1899 and 1900, a direct current plant. Originally it contained three 4200-horse-



SOUTH BOSTON POWER STATION

* See page 65 for a brief description of this important development.



TURBINE UNIT IN LINCOLN POWER STATION

power steam engines. In 1907 two additional 4,200-horsepower steam engines were installed. In 1919 one of the steam engines was removed and a 25,000-kilowatt alternating current turbine unit was added.

Long outmoded, in 1931 and 1932 this station was almost completely re-equipped, with modern boilers built for 475 pounds steam pressure and pulverized-fuel firing. A new 35,000-kilowatt turbine unit was added, and the smaller turbine unit was reconditioned for higher pressure. The old engine units were discarded. Thus in the Lincoln plant today there is a rated capacity of 60,000 kilowatts of high-efficiency machinery.

POWER SUBSTATIONS

THE substations which formed part of the alternating current system installed in 1911 were manually controlled, rotary converter stations. The automatic type of control was introduced in 1926, in the Oak square substation in Brighton, and has since been extended to others.

In the automatic substation, the operation of the switching mechanism is controlled by a number of relays which respond to fluctuations in the power circuit. Thus, the switches open and close automatically, doing the work formerly done by hand. While normally automatic, the substations are under the supervisory control of the system operator, located at the South Boston plant. He is automatically kept informed of operations in the substations and can take over the control if desired. Four rented telephone wires provide the supervisory control connections.

On Jan. 14, 1931, a novel type of substation, a mercury rectifier substation, was put into commission. This is the Newbury substation, behind the Massachusetts subway station. Here the rectifier, a stationary device, changes the current from alternating to direct form. This is automatically controlled.

THE TRACKLESS TROLLEY

A RECENT and promising development on the "El" system has been the adoption of the trackless trolley, a combined bus and trolley car. The vehicle is similar in general appearance to a modern type of Elevated bus, but on the roof are two swivel trolley poles which permit sufficient deviation either way from the center line of double trolley overhead construction to permit passing around other vehicles and drawing up to the curb.

The vehicle is driven by one or two large-capacity electric motors, and the control and braking equipment is designed for quick, smooth starting and stopping.

The first trackless trolley service on the "El" was inaugurated on Apr. 11, 1936, on Cambridge street, between Harvard and Lechmere squares, in Cambridge, with the vehicles looping at the Bennett street carhouse near Harvard square.

The Railway's second trackless trolley line began operation on Jan. 9, 1937 (after partial service had started on Nov. 28, 1936), between the Linden section of Malden and Everett Terminal. The third line (started June 19, 1937) connected Woodlawn Cemetery, in Everett, and the Terminal; and the fourth (started Sept. 11,



TRACKLESS TROLLEY ON BROADWAY, EVERETT

1937) ran from Malden square to Everett Terminal, by way of Ferry street and Broadway.

The fifth trackless trolley line, on Dec. 11, 1937, replaced car service between Malden and Chelsea squares, by way of Ferry street and Everett avenue; part of the service being diverted by way of Broadway, Everett square and Chelsea street. Except for car service on Main street, West Everett, all Everett service is now trackless trolley.

The sixth line, which began service on April 2, 1938, is in Cambridge, and connects Bennett street carhouse with the junction of Mt. Auburn street and Aberdeen avenue by way of Huron avenue. It is the first line to pass through a subway station, which it does in the surface line subway at Harvard square.

These new trackless trolley services have been installed either to replace car lines, or to provide additional service between points previously not adequately served. The vehicle occupies a place between the surface car and the bus as to carrying capacity and flexibility. It also provides load for the Railway's large power plants, and possesses excellent operating characteristics in traffic.

SNOW FIGHTING ON THE "EL"

BOSTON has a winter climate that, at times, seriously handicaps street transportation. In early horse-car days, the car bodies were, if necessary, mounted upon runners to form sleighs. Electric operation required clear tracks, which were kept clear during storms by means of rail plows and sweepers, supplemented by manual labor.

The "El" trustees confronted unusually difficult operating conditions during their second winter, the loss of a million dollars being chargeable, directly and indirectly, to snow. During several of the seventeen winters that have since elapsed there have been heavy snowfalls. During the last ten or fifteen years, automotive street traffic and the use of buses by the Railway, and more recently trackless trolleys, have brought snow clearance problems of their own.

A consistent effort has been made from year to year to improve the Railway's equipment and procedure for fighting storms, until today full service can be maintained through any storm which is likely to occur. Rail plows and sweepers during recent years have been displaced with powerful trucks, equipped with snow plows and sanding equipment.*

* In the *Electric Railway Journal* for March 26, 1927, appeared an illustrated article by H. M. Steward, on new methods of handling snow on the "El." The subject was covered comprehensively in articles in recent issues of "Co-operation" as follows: January, 1935, page 15; November, 1936, page 59; March, 1937, page 15.

EMPLOYEE-MANAGEMENT RELATIONS

UPON Mr. Dana's appointment as general manager of the Railway, he felt the need of maintaining and extending the close contact with the personnel which he had developed in positions of less but increasing responsibility. This feeling led to the issuing of a monthly employees' leaflet, aptly named "CO-OPERATION," beginning with January, 1922.



LONG-SERVICE EMBLEM
Exact Size

The primary purposes of "CO-OPERATION" were, and have continued to be, to furnish employees with interesting facts about the Railway and to provide a means of contact between the employees and the management. Its files provide a fairly complete running history of the past 16 years.

The four special historical issues, commemorating 50 years of unified transportation in this community, of which this is the last, carry the record much farther back and summarize its later phases.

Mr. Dana also assisted employees in self-improvement, by arranging for instruction on the property and elsewhere in subjects of a varied nature. Preference has been given to topics bearing upon the everyday work of employees.

Mr. Dana has participated in all of the activities of what is now known as the "special-training program." In recent years it



EMPLOYEES OF 50 YEARS SERVICE AND MORE IN 1927, WITH GENERAL MANAGER

Sitting left to right: Frank A. McAvoy, asst. to supv. of timetables; Charles Seaver, motorman; John Howard, inspector; Michael Long, motorman; Timothy Connell, supv. of timetables; Patrick W. Banks, starter; John Carl, inspector; George A. Gilman, inspector. Standing, left to right: George H. Robinson, painter; Edward Dana, general manager; Henry W. Holbrook, gateman; Norman L. Dorr, harness maker; Edward J. Sweeney, motorman.

has proved desirable to concentrate upon job training in fields not covered in the routine departmental instruction.

An outgrowth of this training activity is the Boston Elevated Railway Supervisors' Association, which for the past ten years has provided the auspices for social events and interesting addresses.

The interest of the management in the Railway personnel has also, for the past decade, been given

tangible form by the award of gold emblems to employees of 25 years of service or more. This began with a luncheon given in 1927 by Mr. Dana to men of 50 years' service or more. It led to the award of long-service gold emblems, first to the 50-year and 45-year men, and later, in 5-year groups, to all those of 25 years' service and more. The emblems are exchanged as the employee passes from one 5-year group to another.

There are now nearly three thousand active and retired employees who have received emblems, and several hundred more who have recently come in to the 25-year group are entitled to wear them.

A recent addition to the list of personnel projects fostered by the management is the Boston Elevated Employees Credit Union, initiated at a meeting called by Mr. Dana for Dec. 11, 1935. This is chartered under the State Banking Commission, and operated entirely by the employees. The Railway makes payroll deductions for dues and repayment of loans if requested.

SAFETY ON THE "EL"—THE BRADY AWARDS

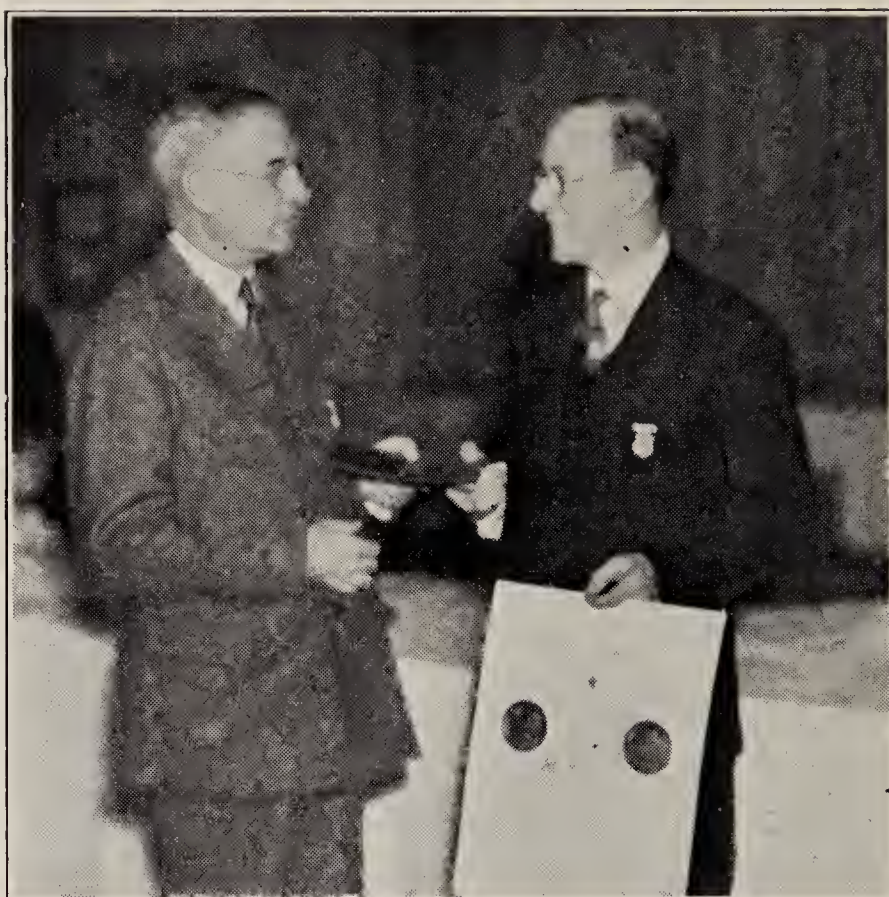
THE Boston Elevated has been a leader in accident prevention ever since it began operating the West End street cars back in 1897. The automobile was then not a serious accident problem, but open cars were a constant accident hazard, and even closed cars, with their open platforms, were none too safe. When the late



FACE OF THE BRADY MEDAL
Year of award is engraved on reverse.

Hon. Russell A. Sears became head of the claim department in 1902 he threw himself actively into this work.* He continued to apply to it his resourcefulness and legal skill until his death in 1932.

Several years before the trustees took control of the Elevated a national safety competition had been established among electric railways by the American Museum



MR. DANA ACCEPTING AWARD OF BRADY MEDAL IN 1936
Frank R. Phillips, president, American Transit Association, is presenting the medal.

of Safety and the American Electric Railway Association (now the American Transit Association). The first awards were made in 1915, and the Railway received the award for railways of the largest size.

The World War interrupted the competition and it was not re-established until 1927. The Railway entered the 1929 competition (for the safety record of 1928), and won it. The story was repeated in 1931 and 1932. Then, however, a rule was adopted that any railway winning the award twice in succession, as the "El" had done, was debarred for three years, and again if a company so debarred should win again when eligible it would have to wait five years more before entering.

In 1936 the Railway presented its record for 1935, and won again. Now, by reason of the 5-year rule, the Railway cannot become a competitor until 1942, when its 1941 record becomes eligible for entry.

The Brady Medal competition has provided a stimulus to the employees, and the public takes pride in the reputation for safety which the Boston Elevated has established.

* A comprehensive summary of the safety activities of the Railway was given in the issue of the *Electric Railway Journal* for Jan. 11, 1913. The writer was Edward Dana, assistant to the superintendent of transportation, who, fresh from college, had joined the Railway organization a few years before. The article disclosed the essential principles that have since guided the management in keeping down accidents.

PUBLIC RELATIONS AND TRAFFIC PROMOTION

WHEN trustee control of the "El" began, the problem of getting business was not a serious one. There was little competition. Public relations, as that term is used today, were reasonably friendly, and the public had confidence in the good intentions of the management. However, with the property in its rundown condition during the first few years of the trustee era, there was much to explain. This situation was remedied with reasonable promptness, but meanwhile the automobile was developing into a serious competitor. In the first four trustee years automobile registrations nearly doubled, and they continued to increase rapidly for several years more. The result was reduced riding on the "El."

In 1925 the idea which later took the form of the slogan: "Park Where the 'El' Begins" led to the leasing of land near the Everett Terminal for the use of patrons. An attempt was made here and elsewhere to encourage parking outside of the congested centers, the remainder of the journey into the City to be made by rapid transit. This principle has been emphasized during the intervening years.

Radio broadcasting during the early trustees years, and since, offered an opportunity to get the Railway's message directly to the public, supplementary to news articles, and newspaper and poster advertising. For example, a series of four broadcasts was given in 1923 and 1924 by Mr. Dana, explaining Boston Elevated conditions and giving statistics of Boston transit requirements. There were also radio talks given by invitation, and in 1928 the management participated in the weekly series "The Transportation Half Hour." In December, 1929, began the "El's" biggest radio undertaking, a 12-week program with original theme song, orchestra and addresses by officials and trustees. Reprints of these talks were afterwards distributed.

The management has maintained amicable relations with the newspapers in the community, even when "El" policies and services were criticized. A consistent effort has been made to furnish the newspapers with news stories about the Railway, and to give the complete facts regarding any situation or development in which the editors may be interested.

In the field of traffic promotion, in addition to using the newspapers and the radio, the Railway utilizes many display spaces on cars, in stations, and elsewhere, to call attention to interesting places and events, with the related transportation facilities. Folders, booklets and, more recently, a comprehensive system map have been



PRESENT BOSTON ELEVATED OFFICIALS AND DEPARTMENT HEADS

Seated, left to right: Willis B. Downey, general counsel; John H. Moran, vice-president and treasurer; Edward Dana, president and general manager; Michael H. Cullen, general auditor; Maurice P. Spillane, general attorney.

Standing, left to right: Harry M. Steward, superintendent of maintenance; Frederick S. Freeman, superintendent of power; Ralston B. Smyth, superintendent of rolling-stock and shops; J. Garfield Stone, purchasing agent; Dares D. Hall, superintendent of transportation.

distributed widely, to enable patrons to use the system to the best advantage, and incidentally suggest further use. The facilities of the Railway to furnish special service, particularly bus service, are given wide publicity.

THE 1918 LEASE REVISED AND EXTENDED

AFTER the Public Control Act had been in operation for a few years, agitation for revision began. Many people looked upon the Act as a necessary wartime emergency measure.

As a result of the demand for revision, the lease of the property by the Commonwealth, originally for a 10-year period with provision for automatic extension unless otherwise decided, was extended, in accordance with legislation enacted in 1931.*

The guaranteed dividend upon the common stock, was reduced from 6 per cent of par value to 5 per cent; provision was made for the retirement of existing preferred stocks of the company through sale of 6 per cent bonds to the Metropolitan transit district† (now the Boston Metropolitan district); an annual compensation tax was specified to be paid by the company to the district

* Chap. 333, Statutes of 1931, "An Act revising and extending the term of the lease of the properties of the Boston Elevated Railway Company and continuing public management and operation thereof."

† The Metropolitan transit district (later the Boston Metropolitan district) was incorporated under Chap. 383, Statutes of 1929, "An act relative to transportation facilities in the Metropolitan district." It comprises Arlington, Belmont, Boston, Brookline, Cambridge, Chelsea, Everett, Malden, Medford, Milton, Newton, Revere, Somerville and Watertown, and is managed by five trustees. The same act established the Metropolitan transit council, consisting of representatives of the municipalities in the district.

to bring up to 2 per cent the margin between the interest received from the company on the district bonds and that paid by the district on the corresponding bonds sold to the public; existing leases of public property by the railway company, including improvements under construction, were extended; provision was made for a report, when a deficit occurred, by the State department of public utilities to the Governor and the Metropolitan transit council; terms were specified for the sale of the property to the Commonwealth, to a political subdivision of the Commonwealth, or to a corporation set up by the Commonwealth for this purpose; as well as the return of the property to the company.

THE LATER TRUSTEES

ON page 21 is given an account of the early board of trustees. The diagram on page 48 shows the terms of the early board members, along with those of the later trustees, to date. The first 10-year period in the life of the board expired in 1928.* In that period, in addition to the men already mentioned, J. Frank O'Hare succeeded Mr. Stevens (who died in office), and served out the unexpired term. Andrew Marshall succeeded Mr. Jackson in 1925, but resigned early in 1927. He was succeeded by Edward E.

* The period ended June 30, but the Governor continued the terms of the members to the end of the year.



PRESENT BOARD OF TRUSTEES

Seated, left to right: Henry J. Smith, secretary; Edward E. Whiting, chairman; Ernest A. Johnson. Standing, left to right: Patrick J. Welsh; William P. Joy.

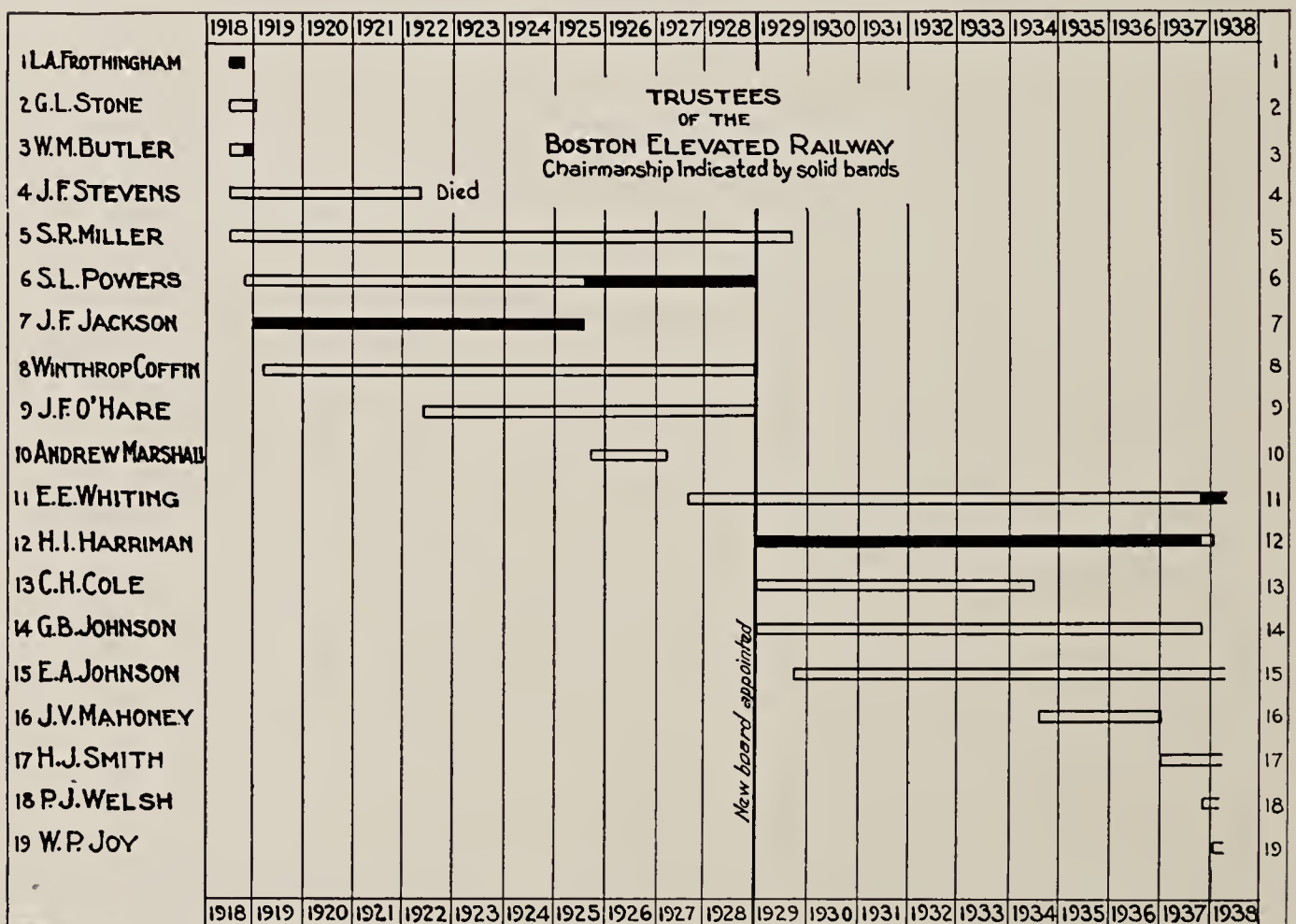
Whiting, present chairman. Mr. Powers succeeded Mr. Jackson as chairman, and served as such for the remainder of the term.

The new board was appointed toward the end of 1928, Mr. Whiting and Mr. Miller being continued. Henry I. Harriman, Gen. Charles H. Cole, and George B. Johnson were appointed by Governor Alvan T. Fuller. Mr. Miller was succeeded in 1929 by Ernest A. Johnson, appointed by the new Governor, Frank G. Allen.

The 1928 board remained intact until 1934, when General Cole resigned, and Governor Joseph B. Ely appointed John V. Mahoney in his place.

Judge Mahoney resigned as a member of the board on Jan. 7, 1937, and on the same date His Excellency, Governor Charles F. Hurley, appointed Henry J. Smith to fill the vacancy. Mr. Harriman resigned as chairman of the board on Nov. 6, 1937. Mr. Whiting was elected chairman two days later, and Mr. Smith was elected secretary.

G. B. Johnson resigned as a member of the board on Nov. 8, 1937, and on Nov. 10 the Governor appointed Patrick J. Welsh to fill the vacancy. Mr. Harriman resigned as a member of the board on Jan. 17, 1938, and on Jan. 18 the Governor appointed William P. Joy to fill the vacancy.



GRAPHICAL RECORD OF TENURE OF OFFICE OF PUBLIC TRUSTEES

SOME SIGNIFICANT DATES IN LOCAL TRANSPORTATION

(For opening dates, subway and elevated lines, see pages 73 and 96)

| | | |
|----------|-------------------|---|
| 1856 | (Mar. 26) | First street car in this region; operated on Cambridge Horse Railroad. |
| 1887 | (Nov. 12) | West End Street Railway absorbed Cambridge Railroad, Metropolitan Railroad, South Boston Railroad and Boston Consolidated Street Railway. |
| 1888 | (July 2) | Electric power used successfully on Lynn & Boston Street Railway. |
| 1889 | (Jan. 1) | First electric car operated from Allston to Park Square, Boston. (Intown section with conduit system.) |
| 1891 | | Double-deck cars tried for experimental period, Bowdoin square to North Cambridge. |
| 1894 | (July 2) | Boston Elevated Railway Company chartered. |
| 1897 | (Dec. 30) | Boston Elevated took possession of West End Street Railway, having operated it from Oct. 1. Agreement signed Dec. 9, 1897. |
| 1899 | (Feb. 18) | President McKinley and party inspected subway. |
| 1900 | (Dec. 24) | Last horse car operated by "El"; on Marlboro street line. |
| 1907 | (Feb. 12) | Steel cars introduced on elevated line. |
| 1911 | (July) | Prepayment type of street car first used locally. |
| 1911 | (Nov. 13) | South Boston power plant started, inaugurating use of alternating current power distribution. |
| 1918 | (July 1) | Public control of "El" began. |
| 1918 | (Jan. 1) | 7c fare inaugurated. |
| 1918 | (Dec. 1) | 8c fare inaugurated. |
| 1919 | (Jan. 11) | One-man car operation began on Grove street, West Roxbury. |
| 1919 | (July 10) | 10c fare inaugurated. |
| 1920 | (Feb. 1) | Pension plan put in operation. |
| 1920 | (May 1) | Cambridge subway sold to Commonwealth. |
| 1921 | (Mar. 26) | First local 5c line started. |
| 1922 | (Feb. 24) | First bus route put in operation. |
| 1922 | (June 10) | West End Street Railway consolidated with "El". |
| 1923-'24 | (December to May) | Personnel and equipment transferred from obsolete shops to Everett shops. |
| 1927 | (Oct. 19) | Boston Elevated Railway Supervisors' Association formed. |
| 1928 | ((Aug. 4) | First long-service emblems awarded. |
| 1930 | (Oct, 6, 7) | Railway carried 2,765,727 revenue passengers in two days during American Legion convention. |
| 1931 | (Aug. 14) | Railway received check for \$21,000,000 from Metropolitan Transit Commission (now Boston Metropolitan District) to retire preferred stocks. |
| 1931 | (May 19) | Bill passed by Legislature, extending "El" lease for 28 years. |
| 1936 | (Jan. 10) | Boston Elevated Employees Credit Union formed. Chartered Jan. 24, 1936. |
| 1936 | (April 11) | First trackless trolley service inaugurated. |
| 1936 | (June 9) | Chelsea Division of Eastern Massachusetts Street Railway purchased. Operation started June 10. |
| 1937 | (July 24) | First passenger service with experimental "P.C.C." (Presidents' Conference Committee) car. |
| 1937 | (Jan. 13) | Railway introduced buses driven by Diesel engines on Chestnut Hill line. |

INDEX

(* After page number indicates portrait)

- Accident prevention program, 103
 Adams square headhouse, 74 (photo)
 "Alley Route," proposed rapid-transit route in Boston, 44
 American Street Railway Association (predecessor of American Transit Association) organized in Boston, 26, 27, 28
 Atlantic avenue loop, 57, 58, 62, 63, 64
- Back Bay district, 8 (photo), 13
 Baker, Charles F., superintendent of motive power and machinery, 53
 Bancroft, Gen. William A., president 1899-1916; 15, 16, 48*, 49, 74
 Barnum, H. Ware, general counsel, 84
 Beacon Hill tunnel, 67
 Beeler, John A., consulting engineer for Railroad Commission, 83
 Benjamin, George, trainmaster, R.T.L., 54
 Birney "safety" car, 85, 86
 Boston-Cambridge line (first incorporated horse railway line in Boston), 7, 9
 Boston Consolidated Street Railway, 17
 Boston Elevated Railway Company, general items: Legislation for incorporation and inauguration of service, 45, 49, 50; early directors, 47; West End lease, 33, 47, 49, 50; takes possession of West End, 35; consolidated with West End, 36, 88; first annual report, 51; legislation for public control, 79, 106; public trustees, 80, 81, 107 (chart); officials and department heads, (photo), 106. (See also Rapid Transit, Subway and Tunnels, Opening Dates, Elevated Railway Lines in Boston, Legislation)
 Boston Transit Commission (predecessor of Boston Transit Department), 45
 Boston Transit Department (successor to Boston Transit Commission), 131
 Bowdoin square-Harvard square demonstration line, 23
 Boylston street subway, 52, 70, 71, 72, 95
 Brady, Anthony N., safety medals, 103 (photo), 104 (photo)
 "Broomstick Train, The," by Dr. Oliver Wendell Holmes, 28, 29
 Brush, Matthew C., president, 1916-1918, 48*, 74, 78, 84
 Buses: First buses (photo) and first route (map), 90; Diesel bus, 91 (photo); mileage and number of buses in operation, 1937, 91; special bus revenue, 1937, 91; revenue bus-mileage, 1922-1937, 91 (chart); interchange point with cars, Boylston street, 93 (photo)
 Butler, William M., early trustee, 80*, 81
- Cable system explained: 19, 20, 22, 25
 Cambridge-Boston line, 7, 9
 Cambridge-Dorchester extension, 92. (See also Cars)
 Cambridge Horse Railroad Company, 9, 10, 11, 14, 15, 17
 Cambridge Subway, 52, 66, 67, 69, 70, 75, 88, 89
 Cars: On Beacon street, Brookline, in 1889, 23 (drawing); number in United States in 1888, 25; open cross-bench, 31 (photo), 65; wood and all-steel elevated, 56 (photo); prepayment, 65 (photo); early single and double-truck box, articulated unit, semi-convertible, and center-entrance, 68; all-steel Cambridge Subway, 75; owned by West End in 1897, 50; steel cars replace wooden on elevated lines, 59, 86; Birney "safety," 85, 86 (photo); "No. 5 semi," 86 (photo); from Eastern Massachusetts St. Rwy., 86; "P.C.C." car, 86; cars for East Boston tunnel and Cambridge-Dorchester extension, 86, 87, 94 (photo); 1-man cars, 87
- Charlestown Bridge, 57 (photo)
 Chelsea and Revere lines, Purchase of, 97
 "Citizen's Line," Washington street omnibus line, 4
 Coffin, Winthrop, trustee, 1919-1928, 81
 Cole, Gen. Charles H., trustee, 1928-1934, 108
 Conduit system, Bentley-Knight, 22, 23, 24 (drawing)
 Coolidge Corner-Chestnut Hill reservoir line, 21
 "Co-operation" started, 102
 Court street station, abandoned, East Boston tunnel, 62 (photo)
 Credit Union formed, 103
 Cullen, Michael H., present general auditor, 77, 84, 106*
- Dana, Edward, present president and general manager, 54, 77, 78*, 84, 104, 105, 106*
 Data, Salient, of trustee control, 82 (chart)
 Dates, Some Significant, in Local Transportation, 109 (table)
 Diesel bus, 91 (photo)
 Dorchester tunnel, 52, 72, 73
 Doty, Clark, general foreman, R.T.L., 54
 Downey, Willis B., present general counsel, 84, 106*
 Dudley street terminal (Roxbury), 58, 64
- East Boston tunnel: Construction authorized, 50, 60; stations, 52 (chart); opened, 61; extended, 62; changed to rapid-transit, 94
 East Cambridge viaduct, 52, 70, 72
 Eastern Massachusetts Street Railway: Sale of Hyde Park line to City of Boston, 92; sale of Chelsea and Revere lines to "El," 97. (See also Cars)
 Electrification of lines, 21, 22, 25, 30, 35, 43
 Elevated Railway: New York, 36, 37; early plans in Boston, 34. (See also Rapid Transit)
 Elevated railway lines in Boston: Definitely projected, 47; preliminary work done, 51; designs approved and contracts let, 56 (photo); route, 57; construction on Charlestown Bridge (photo), 57; stations, 52 (chart), 58; rolling-stock, 58, 59; extended to Forest Hills, 64; extended to Everett, 85
 Elevated railway lines, opening dates, 73, 96
 Elevated-subway system. Evolution of, 52 (chart). (See also Rapid Transit)
 Emblems, Long-service, 102 (photo); 103
 Emmons, Charles D., former general manager, 84
 Employee-management relations, 102
 Employee-training program, 102
 Everett extension of main elevated line, 85
- Fares, 4, 50, 83, 87, 88
 First: local conduit and overhead-contact lines opened, 22; Boston subway, built under statutes of 1894, 33; street railway line in country, 7; local horse railway, 7; street railway organized in Massachusetts, 7; incorporated horse railway to begin operation 9; large road to electrify, West End, 23; annual report of B. E. Rwy., 50; board of trustees, "El," 80, 81; motor bus (photo) and route (map), 90; trackless trolley and route, 100
 Flint, Ernest M., present assistant to president and general manager, 76
 Forest Hills extension of main line, 52, 64, 65, 88
 Freeman, Frederick S., present superintendent of power, 77, 84, 106*

- Frothingham, Louis A., chairman, first board of public trustees, 80*, 81
- Gaston, William A., president, 1896-1899, 47, 48*, 49, 51
- Gleason, Charles B., present assistant to general counsel, 75, 84
- Goodspeed, Joseph H., former comptroller, 53
- Governor square improvements, 96
- Grove Hall carhouse, 35 (photo)
- Hall, Dares D., present superintendent of transportation, 55, 84, 106*
- Hanson, Harry H., former assistant superintendent of transportation, 54
- Hapgood, Richard, former superintendent of surface tracks, 54
- Harriman, Henry I., trustee, 1928-1938 (chairman, 1928-1937), 33, 108
- Harvard square-Bowdoin square line, 22, 45
- Hathorne Line, ("Shawl Line"), 5 (photo)
- Highland Street Railway, 13, 15, 26
- High-speed trolley line, Ashmont to Mattapan, 93
- Hile, Charles H., former chief of maintenance, 53
- Holmes, Dr. Oliver Wendell, "The Broomstick Train," 28, 29
- Horse cars: "Horse Railway Enters the Field," 6 (drawing); in front of Winthrop House in early days, 16 (drawing); at Church Green in middle horse-car days, 18 (drawing); served Market center at Boylston and Washington streets, 20 (drawing) focal point of horse-car traffic 75 years ago, 21 (drawing); on Marlboro street, 46 (drawing); number in United States in 1888, 25; local development, 7; sidelights on early days, 14
- Horse-car lines: Harvard College to Fitchburg station, 7; Boston-Roxbury (Metropolitan), 7, 9; Boston-Cambridge, 7, 9; Charlestown, 11; South Boston, 11; Lynn & Boston, 11; mileage and average length of lines in United States in 1888, 25
- Horses found useful by N.Y., N.H. & H.R.R., 15 (drawing)
- Huntington avenue subway, 97
- Hyde Park service, 92
- Jackson, James F., chairman of board of trustees, 1918-1925, 81, 107, 108
- Johnson Ernest A., trustee, from 1929, 107*, 108
- Johnson, George B., trustee, 1928-1937, 108
- Joy, William P., trustee, from 1938, 107*, 108
- Kimball, George A., former engineer of elevated lines and subway construction, 55, 56
- Last horse cars in Boston, 46 (drawing)
- Learned, Clarence E., former superintendent of inspection, 84
- Legislation: to permit consolidation to form West End Street Railway, 33; to create Boston Transit Commission, 45; to incorporate Boston Elevated Railway Company, 45, 47; to promote rapid transit, 49, 50; to provide for public control, 79, 106; to permit consolidation of West End with "El," 88; to provide for rapid-transit extension in Dorchester, 93
- Lindall, John, advisory equipment engineer, former superintendent of rolling stock and shops, 53, 84
- Little, Samuel, president, West End Street Railway Company, 12*, 36, 47
- Long-service: emblems, 102 (photo), 103; 50-year employees' luncheon, 102 (photo)
- Longstreet, Daniel F., early general manager, West End Street Railway Company, 17, 18, 19, 20, 26, 27
- Mahler, Edward, former purchasing agent, 76, 84
- Mahoney, Judge John V., trustee, 1934-1937, 108
- Map, Military, of Boston and environs used by General Washington, 2 (drawing), 3
- Marshall, Andrew, trustee, 1925-1927, 107
- Mattapan, high-speed trolley line, 93
- Maverick square incline for surface cars 61 (photo)
- Meigs elevated railroad, 39, 40 (photo), 41, 42, 45, 46, 47, 70
- Meigs, Capt. Joe V., inventor-promoter, organizer of Boston Elevated Railway Company, 40
- Merrill, Hon. Moody, president, Highland Street Railway Company, 26
- Metropolitan Railroad (Boston-Roxbury line), 7, 9, 13, 17
- Metropolitan Transit Commission, 44
- Middlesex Railroad, 13
- Miller, Stanley R., trustee and secretary of board, 1918-1929, 80*, 81, 108
- Moran, John H., present vice-president and treasurer, 77, 84, 106*
- Morgan, J. Pierpont, banker and financial backer of Boston Elevated Railway Company, 47, 70.
- Multiple-unit control train, demonstration, 55 (photo)
- Neal, J. Henry, president, 1918-1919, 53, 78*, 84
- Neff, Stewart S., former superintendent, elevated division, 55, 56
- O'Hare, J. Frank, trustee, 1922-1928, 107
- Omnibuses, 3, 4, 5 (photo), 6 (drawing), 14
- One-man car operation, 87
- Opening dates, subway and elevated lines: 1897 to 1918, 73; 1918 to 1937, 96
- "P.C.C." car, 86
- Park square-Brighton line, 21, 22
- Pasho, Herbert A., former superintendent, R.T.L., 53, 54, 56
- Passimeters introduced, 88
- Pearson, Frederick S., chief engineer, West End Street Railway, 23
- Pension plan, 92
- Pillsbury, Hon. Albert E., counsel for Boston Elevated Railway Company, 49
- Populations, Early: Boston, 1727, 3; Boston, Cambridge, Charlestown, Roxbury, South Boston in 1855, 11; Lynn, 1859, 13
- Potter, H. Bertram, former assistant general manager, 84
- Power development, 27, 28, 29, 30, 31, 50, 59, 65, 98. (See also Power Stations and Power Substations)
- Power Stations: Allston, 21, 22, 26 (drawing), 29, 59; Central, 27 (drawing), 28 (photo), 30, 31, 59; East Cambridge, 30; Lincoln, 59, 66, 98, 99 (photo); South Boston, 59, 65, 98 (photo), 99
- Power substations, 99, 100
- Powers, Samuel L., trustee, 1918-1928 (chairman, 1925-1928), 76, 81, 108
- Prendergast, Daniel L., former real-estate agent, 75, 76, 84
- Prendergast, James M., early director, 47, 76
- Providence Depot of Old Colony Railroad, 37 (photo)
- Public control act: terms, 79; opinion of Hon. William Howard Taft, 80; lease of 1918 extended, 106
- Public relations and traffic promotion: Private automobile problem, parking at "El" stations encouraged, radio broadcasting, newspaper relations, posters and folders, 105
- Rapid Transit: Mr. Whitney reports to stockholders, authorization to build, 34; special commission to study plan, 35; early projects, 36; how New York and Boston differed, 36, 37; complications in Boston, 37; Bigelow and Powers petitions, 38; "central-rail plan," "single-rail plan" and "Manhattan type," 39; Meigs plan, full details, 39, 40, 41, 42; Rapid Transit Commission, appointed, personnel, 42; Rapid Transit Commission's reports and recommendations, 43;

Commission disbanded, 44: (See also Subway Commission); Growth of elevated proposition, 45; Act of 1894 restricts construction, 46; studied by directors, 1895, 47; Act of 1897 "To Promote Rapid Transit, etc.," 49, 50; preliminary work done, 51; problem of development, 51; evolution of subway-elevated system, 52; stations, 52, 58; rolling-stock, 58; 3 and 4-car trains used on main line, 58; steel cars replace wooden cars, 59; adapting Tremont street subway to, 60; extension to Forest Hills, 64, opening dates of, 1897 to 1937, 73, 96; bill of 1923, 93. (See also Elevated-subway system)

Rapid Transit Commission, 42, 43, 44

Richards, Calvin A., president Metropolitan Railroad Company, 12*, 17, 27

Riverbank subway proposed, 70

Rolling-stock and equipment: West End, 50; for Boston Elevated rapid-transit lines, 58, 59; for Cambridge subway, 67, 86, 87; when trustees took control of "El," 81; new purchased, 85; Birney car, 85, 86; acquired from Eastern Massachusetts Street Railway, 86; East Boston tunnel, 86; 1-man cars, 87

Rugg, Julius E., former superintendent of transportation, 12*, 26, 27, 54

Salem street carhouse, early, 32 (photo)

Sears, Hon. Russell A., former general attorney, 76, 84, 104

Sergeant, Charles S., former vice-president, 18, 51, 53, 84

Shops, Repair: Bartlett and Washington streets, 89; Everett, 89; Albany street, 90

Smith, Henry J., trustee, from 1937; (secretary, from 1938), 107*, 108

Smith, James, former superintendent of transportation, 54, 84

Smyth, Ralston B., present superintendent of rolling-stock & shops, 84, 106*

Snow: Cost in winter of 1919-20, 84; snow-fighting problems and equipment, 101

South Boston Railroad, 11, 13, 17

South Station, Site of present, 39 (photo)

Spillane, Maurice P., present general attorney, 76, 84, 106*

Sprague, Frank J., inventor and manufacturer, installed first electric railway in Boston, 20, 21, 54

Stage coaches, 3, 5 (photo)

Stations, rapid transit and surface: "Evolution of the Subway-Elevated System," 52; Pleasant street station, 57, 63; Sullivan square and Roxbury terminals, 58; Dudley street terminal, 58, 64; cost of stations and general design, 58; adapting stations for rapid-transit, 60; East Boston tunnel, 60; Old State House (Devonshire), 61; Court street station, 61, 62; Scollay square, upper and under, 61, 62; State street station, 62; Washington street tunnel stations, 63; Forest Hills extension, 64; Eggleston square, 65; Park street upper and under, 67, 97; Cambridge subway, 67; Harvard square, 67; Stadium, 67; Boylston street subway, 71; Broadway station, Dorchester tunnel, 73, 74; Charles, 88, 94; Andrew square, Fields Corner, Ashmont, 93, Mattapan, 93; Arlington, 95, 96

Stevens, John F., trustee, 1918-1922, 80*, 81, 107

Steward, Harry M., present superintendent of maintenance, 77, 84, 101, 106*

Stone, Galen L., trustee, 1918-1919, 80*, 81

Stone, J. Garfield, present purchasing agent, 76, 84, 106*

"Street Railways, Development of," by W. S. Allen, 7

Street railways: First in country in New York, arguments in favor of 6, 7; objections to, 7; in the late 80's, 25; mileage in 1888, 25

Subway Commission, 44. (See also Rapid Transit Commission)

Subway and elevated lines, opening dates, tables, 1897 to 1918, 73; 1918 to 1937, 96

Subways and tunnels: Henry M. Whitney visualizes need of subways, 32, 33; Act approving construction of subway, 33; Tremont street subway leased and opened, 33, 34; first subway built under Statutes of 1894, 33; opposition to first subway explained by H. I. Harriman, 33; tunnel and elevated lines recommended by Rapid Transit Commission, 43; Subway Commission formed, 44; "Evolution of Subway-Elevated System" showing stations, 52 (chart); trolley-car operation from Pleasant street ceases in Tremont street subway, 57; Cambridge Main street subway and Beacon Hill tunnel, 66; tables of opening dates, 73, 96; investment in subways, tunnels, elevated structure, etc., in 1912, 69

Sullivan square terminal, 58

Supervisors' Association, 103

Sullivan, Thomas F., present chairman, Boston Transit Department, 76

Taft, Hon. William Howard, Chief Justice, U. S. Supreme Court, opinion on Public Control Act, 80; chairman (with Basil M. Manly), National War Labor Board, 83

Terminal stations: elevated lines, 58, 85; Cambridge-Dorchester rapid transit, 93; East Boston tunnel, 95

Thomson, Elihu, inventor and manufacturer, installed early equipment for West End Street Railway, 22, 25

Track construction: Early, 7, 13; recent, 85 (photo)

Trackless trolley developments: First vehicles and routes, 100 (photo); additional routes, 101; purposes served, 101

Traffic promotion and public relations, 105

Transfers, free, 50

Tremont street subway: Lease signed and subway opened, 33, 34; use for elevated line trains proposed, 47; adapted for elevated line trains, 60; scene at Park street during construction, 51 (photo); stations, 52 (chart); alterations at Park street station, 67; abandoned incline in Public Garden, 72 (photo)

Trustees: First board (1918), 80 (photo), 81; changes in board, 81, 107; latest board (1938), 107 (photo); tenure of office, 108 (chart)

Tunnels and subways (see Subways and tunnels)

Union Railroad Company, 9, 13

Washington street tunnel: Need for, 62; authorization, route, difficulties of construction, opened, 63; method of track construction, 63; stations, 52 (chart), 63; Washington street during construction, 69 (photo)

Welsh, Patrick J., trustee, from 1937, 107*, 108

West End Street Railway Company: Organized, 17; early executives, 17; a pioneer in electrification, 19; the "West End era," 25 to 46; contribution to power development, 29; leased by "El," 33; contemplated elevated lines, 34; consolidated with "El," 88

Whiting, Edward E., trustee, from 1927 (chairman from 1937), 107*, 108

Whitney, Henry M., organizer and first president, West End Street Railway Company, 12*, 16, 17, 19, 20, 21, 22, 30, 32, 33, 34, 35, 36

Wilkins, Frank I., present supervisor of inspection, 84

Wilson, Henry L., former treasurer, 18, 19, 84

Winsor, Paul, former chief engineer of motive power & rolling-stock, 53, 56

Winsor, Robert, early director, 49, 53

